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ABSTRACT

The purpose of this study was to determine the educational background characteristics of data processing instructors and their needs for further preparation in the data processing area. Three types of institutions in Minnesota and Wisconsin were identified as pertinent sources of information: (1) secondary schools, (2) post secondary technical institutes, and (3) two year community colleges. A survey questionnaire was sent to data processing teachers at these types of institutions. Based on the survey findings, recommendations were made both for inservice and preservice education of data processing teachers and for further research. Appended are the survey instrument, data processing textbooks in use, and teacher needs in the areas of data processing content and data processing teaching competencies. (STS)

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CONTENT AND METHODOLOGY BACKGROUND AND PERCEIVED COMPETENCIES OF DATA PROCESSING TEACHERS IN MINNESOTA AND WISCONSIN

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J.J.L.
G.N.M.

TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS ii

LIST OF TABLES v

INTRODUCTION 1

Purpose 1
Need 2
Review of Related Literature 3
Business data processing requirements 3
Data processing instructional programs and data processing teachers 5
Development and evaluation of specific instructional materials 9

PROCEDURES 10

Procedures 10
Limitations 12

FINDINGS 13

Teacher Background Characteristics 13
Degrees earned 13
Work experience 16
Teaching experience 18
Program Characteristics 20
Size of school 21
Course titles 21
Textbooks in use 22
Equipment available 23
Content Topics 31
Instruction received by teachers 32
Instruction needed by teachers 35
Importance of topics to the data processing classes 37
Teaching Competencies 39
Instructional background of respondents 39
Instructional needs in teaching competencies 40
Importance of teaching competencies 41

CONCLUSIONS 42

Teacher Background Characteristics 42
Program Characteristics 43
Content Topics 45
Teaching Competencies 45

RECOMMENDATIONS 46

Recommendations Based on the Findings 46
Recommendations for Further Research 50

Page

REFERENCES 52

APPENDICES 55

Appendix A - Questionnaire and Accompanying Letters and Postcards 56
Appendix B - Data Processing Textbooks in Use 67
Appendix C - Alphabetic Listing of Data Processing Textbooks in Use 72
Appendix D - Data Processing Content, Had Instruction 78
Appendix E - Data Processing Content, Need Instruction 84
Appendix F - Data Processing Content, Importance 90
Appendix G - Data Processing Teaching Competencies, Had Instruction 100
Appendix H - Data Processing Teaching Competencies, Need Instruction 109
Appendix I - Data Processing Teaching Competencies, Importance 118

LIST OF TABLES

Table Page

1. Postsecondary Questionnaires Mailed and Returned 11
2. Secondary Initial Inquiries and Questionnaires Mailed and Returned 12
3. Undergraduate Majors and Minors of Data Processing Teachers 14
4. Highest Degree Completed by Data Processing Teachers 15
5. Graduate Majors of Data Processing Teachers 15
6. Number of Years of Data Processing Work Experience of Data Processing Teachers 16
7. Type of Data Processing Work Experience of Data Processing Teachers 17
8. Number of Years of Other Related Work Experience of Data Processing Teachers 17
9. Type of Other Related Work Experience of Data Processing Teachers 18
10. Teaching Experience of Data Processing Teachers 19
11. Courses Being Taught in Addition to Data Processing 20
12. Size of School 21
13. Title of Course(s) in Which Data Processing is Taught 22
14. Availability of Data Processing Equipment - Keypunch 23
15. Availability of Data Processing Equipment - Verifier 24
16. Availability of Data Processing Equipment - Sorter 25
17. Availability of Data Processing Equipment - Interpreter 26
18. Availability of Data Processing Equipment - Reproducer 27
19. Availability of Data Processing Equipment - Collator 28
20. Availability of Data Processing Equipment - Tabulator 29
21. Availability of Data Processing Equipment - Computer, In School 30

Table | Page

22. Availability of Data Processing Equipment - Computer, Off Premises 31

23. Availability of Data Processing Equipment - CRT Terminal, In School 32

24. Availability of Data Processing Equipment - CRT Terminal, Off Premises 33

25. Availability of Data Processing Equipment - Batch Processing Terminal, In School 34

26. Availability of Data Processing Equipment - Batch Processing Terminal, Off Premises 35

27. Availability of Data Processing Equipment - Teletype Terminal, In School 36

28. Availability of Data Processing Equipment - Teletype Terminal, Off Premises 37

29. Data Processing Textbooks Used By Minnesota Postsecondary Technical Institutes 67

30. Data Processing Textbooks Used By Wisconsin Postsecondary Technical Institutes 68

31. Data Processing Textbooks Used By Minnesota High Schools 69

32. Data Processing Textbooks Used By Wisconsin High Schools 70

33. Data Processing Textbooks Used By Minnesota Community Colleges 71

34. Data Processing Content - Had Instruction On This Topic Minnesota Technical Institutes, Wisconsin Technical Institutes 78

35. Data Processing Content - Had Instruction On This Topic Minnesota High Schools, Wisconsin High Schools 80

36. Data Processing Content - Had Instruction On This Topic Minnesota Community Colleges 82

37. Data Processing Content - Need Instruction On This Topic Minnesota Technical Institutes, Wisconsin Technical Institutes 84

38. Data Processing Content - Need Instruction On This Topic Minnesota High Schools, Wisconsin High Schools 86

Table | Page

39. Data Processing Content - Need Instruction On This Topic Minnesota Community Colleges 88

40. Data Processing Content - Importance Of This Topic In My Class(es) - Minnesota Postsecondary Technical Institutes 90

41. Data Processing Content - Importance Of This Topic In My Class(es) - Wisconsin Postsecondary Technical Institutes 92

42. Data Processing Content - Importance Of This Topic In My Class(es) - Minnesota High Schools 94

43. Data Processing Content - Importance Of This Topic In My Class(es) - Wisconsin High Schools 96

44. Data Processing Content - Importance Of This Topic In My Class(es) - Minnesota Community Colleges 98

45. Data Processing Teaching Competencies - Had Instruction In This Competency? - Minnesota Postsecondary Technical Institutes, Wisconsin Postsecondary Technical Institutes 100

46. Data Processing Teaching Competencies - Had Instruction In This Competency? - Minnesota High Schools, Wisconsin High Schools 103

47. Data Processing Teaching Competencies - Had Instruction In This Competency? - Minnesota Community Colleges 106

48. Data Processing Teaching Competencies - Need Instruction In This Competency? - Minnesota Postsecondary Technical Institutes, Wisconsin Postsecondary Technical Institutes 109

49. Data Processing Teaching Competencies - Need Instruction In This Competency? - Minnesota High Schools, Wisconsin High Schools 112

50. Data Processing Teaching Competencies - Need Instruction In This Competency? - Minnesota Community Colleges 115

51. Data Processing Teaching Competencies - Importance Of This Competency In My Class(es) - Minnesota Postsecondary Technical Institutes 118

52. Data Processing Teaching Competencies - Importance Of This Competency In My Class(es) - Wisconsin Postsecondary Technical Institutes 121

Table | Page

53. Data Processing Teaching Competencies - Importance Of This Competency In My Class(es) - Minnesota High Schools 124

54. Data Processing Teaching Competencies - Importance Of This Competency In My Class(es) - Wisconsin High Schools 127

55. Data Processing Teaching Competencies - Importance Of This Competency In My Class(es) - Minnesota Community Colleges 130

INTRODUCTION

This section describes the purpose and specific objectives of the study. Also included are the need for the study and a review of some of the relevant research completed on related issues.

Purpose

Most business teacher education programs are responsible for preparing undergraduate students to become data processing teachers and for assisting persons currently teaching this subject to upgrade their competencies in this field. In order to better meet the needs of these persons, a survey was conducted among Minnesota and Wisconsin teachers currently teaching business data processing. It was assumed that one basis for changing current collegiate programs for teachers is to obtain input from those for whom these programs are designed.

It was anticipated that two main purposes would be accomplished. First, judgments might be made concerning the adequacy of existing pre-service data processing instructional programs. Second, judgments might be made regarding those data processing content topics or methodological areas for which in-service education is needed. These needs would be indicated by those topics or methodological areas in which teachers expressed a need for further study and also by the degree of importance attached to the topics or areas.

To accomplish these purposes, three main questions were to be answered:

1) What are the background characteristics of data processing teachers and what are the characteristics of their instructional programs in the following areas:

   a) education and work experience backgrounds;
   b) levels of instruction: secondary, postsecondary technical institute, or postsecondary two-year community college;
   c) titles and lengths of courses in which data processing content is taught;
   d) textbooks used for teaching data processing content; and
   e) data processing equipment available for instruction?

2) With respect to data processing content topics,

   a) in which have teachers had previous instruction?
   b) in which do teachers need further instruction?
   c) what is the relative importance of each topic in a teacher's class?

3) With respect to instructional methodologies for teaching data processing,

   a) in which methodological areas have teachers had previous instruction?
   b) in which methodological areas do teachers need further instruction?
   c) what is the relative importance of each methodological area in a teacher's class?

Need

Automatic processing of data using a computer has become the common means of conducting business in this country. West (1973, pp. 88-89) reported in his survey of New York City firms that over seventy percent of firms with 100-499 employees use computerized financial systems. The proportion increases for larger firms. Little argument is needed for the expectation that instruction for and about business be dictated, at least in part, by the true character of business operations. Any instructional program in either secondary or postsecondary schools which includes any general business instruction or which claims to prepare students for business occupations must deal with the automatic processing of business data.

The challenge for business teacher education programs follows this need. It is their responsibility to prepare teachers both to teach about data processing and to prepare students for data processing occupations. Studies, briefly reviewed in the next section, exist which suggest the nature of business data processing and appropriate instructional content. These studies provide one source of information for developing content for business teacher education programs. Another important source of information for meeting the immediate needs of teachers is to ask them for their own expression of the importance of data processing topics for their classes and their needs for further instruction. Few studies have included teachers as the basis for assigning need priorities for instructional programs. Generally the implication is made that what is done in business should be known and taught by teachers.

But this failure to ask teachers about their needs is not unique to business education. Ingersoll (1975, p. 2) concluded that:

> inservice education is most often something that is done at the teacher rather than with the teacher. Decisions as to content, form, and needs for inservice training have typically been handled at an administrative level with little input from the teaching faculty.

In addition, Brimm and Tollett (1974) present evidence to suggest that teacher attitudes reflect a general feeling that most inservice training is not responsive to their own needs.

Thus, in the current study, input is being sought from teachers to assess their own perceptions of their inservice needs.

No known studies look directly at the methodological instructional needs of data processing teachers. While a few studies have investigated different approaches for teaching data processing content, no identified study has asked data processing teachers what they think their instructional needs are in this area. If an objective of teacher education programs is not only to identify appropriate content but also to assist teachers in presenting this content to students effectively, methodology should be of equal concern for both pre- and inservice teacher preparation.

Review of Related Literature

Computers began to be used for business applications in the early 1950's. Not until the early 1960's, however, were major research projects in business education directed toward examining the implications of this phenomenon for educational institutions. The intent of this brief review is to highlight some of the major research projects. It does not include all of the research relating to data processing in general, data processing for four-year collegiate programs not related to teacher education, nor periodical literature that is not related to a specific research project.

Three different types of research can be identified as attempting either to identify appropriate data processing content for educational institutions or to recommend appropriate instructional approaches for teaching this content. The first type of study examines the use of data processing in business and the requirements for data processing personnel. These findings are then translated into instructional needs. The second type of study examines the status of data processing instruction within existing educational programs. The intent of these studies is to assess the programs which are available and to compare these offerings with recommendations from business or from a panel of experts in data processing instruction. The third type of research has investigated the outcomes which result from different instructional approaches when teaching certain data processing content. There have been few such studies, particularly those which relate specifically to business data processing instruction as opposed to programming instruction in scientific fields. The research findings in these three areas will be briefly reviewed as they relate to the present survey.

Business data processing requirements. The earliest and largest group of studies directed toward improving data processing instruction were those which surveyed business data processing installations to judge their impact on course content. One of the earliest studies to examine the relationship of electronic data processing to office employment was Frisbee (1961). Edwards (1959) and Sweatt (1962) examined the effect of automation on accounting instruction in particular. Studies by Thompson (1963), LaSalle (1963), Jones (1964), Wenner (1964), Carter (1965), and Gibson (1967) were among others which surveyed business installations and drew implications for curriculum planning for secondary and postsecondary instructional levels. These studies preceded the national study by Bangs and Hillestad (1968), and their recommendations parallel many recent studies. For example, Bangs and Hillestad (1968, p. 88) cite Gibson's (1967) conclusion that:

> A four-year college degree was necessary for systems analysts; that it is helpful, but not essential, for data processing managers and programmers; and that a high school graduate can easily obtain employment in the electronic data processing office as a console operator or a keypunch operator.

Even though these recommendations have been supported by other studies, such as that by Wenner (1964) which resulted in a widely disseminated monograph (Wenner, 1966), other persons (e.g., Wood, 1967) have argued for a more comprehensive, vocational data processing program at the secondary level.

The most comprehensive study of data processing and its implications for instruction was conducted in 1968 by Bangs and Hillestad. They sought to obtain not only the perceptions of business users of data processing equipment for curriculum development, but also information about the then existing data processing programs in educational institutions. High school and postsecondary curricula were recommended. Their findings cover the areas of job descriptions and job opportunities, teachers of data processing, and data processing course descriptions. Because of their relation to the data collected in this survey, their findings concerning teachers of data processing are listed below:

1. A greater proportion of the high school data processing teachers hold degrees than post high school data processing teachers, but post high school teachers had had more advanced training in data processing.

2. More high school data processing teachers received at least some of their data processing background by attending manufacturers' schools than did the post high school data processing teachers.

3. More of the post high school data processing teachers had had work experience, data processing work experience, and on-the-job training than had the high school data processing teachers.

4. More high school data processing teachers are getting business experience in the summer than are post high school data processing teachers (Bangs and Hillestad, 1968, pp. 10-11).

Two other major studies were completed at approximately the same time and in conjunction with the Bangs-Hillestad project. These have also been a source of further curriculum development and other research. Christensen (1969) outlined basic concepts in data processing appropriate for the secondary level. Korn (1968), using survey results, outlined a secondary curriculum that described the basic components of many introductory courses in data processing. The following are the main topics which comprise this basic course:

History of data processing
Purpose and function of unit record equipment
Input/output media and devices
Primary storage and retrieval
Arithmetic and logic functions of the computer
Control unit of the computer
Introduction to programming
Total systems concept (Korn, 1969, pp. 109-110)

More recent studies have followed the direction of these earlier ones to establish or reconfirm the requirements for personnel employed in data processing occupations and to draw instructional implications. All have depended at least in part on questionnaire instruments to obtain their data. Curless (1973) sought to determine the change in job requirements from 1969 to 1973. Gunderson (1972) looked at the broad implications of the data processing service industry on education and business. Hurst's (1970) findings regarding the knowledges and skills required for data processing positions reiterated the need by most workers for basic communications skills and problem solving abilities.

Borcher and Joyner (1973) used the questionnaire method of collecting task performance data for persons in several data processing occupations and compared their similar components. These data still remain largely in the form of task inventories and did not yield specific curriculum recommendations. A recent study by Toyne (1974) goes one step further and uses assessments from data processing managers to derive behavioral objectives for entry level computer programmers and console operators.

While most of these studies recognized implicitly that the content of data processing courses would serve at least two purposes--general education in the data processing field and some occupational preparation--Rall (1974), assuming that the secondary level will probably continue to have a primarily general education, exploratory focus, has developed broad goals for data processing instruction for non-data processors. He identified this content by interviewing business persons in ten occupational categories who were working with computer installations. The questionnaire developed after obtaining the perceptions of these persons was mailed to 250 other potential respondents. (Who these respondents were and the number of questionnaires returned was not included in the summary of this study.) Ten conclusions were then drawn regarding the general goals of data processing instruction as a general education component for secondary schools.

Content similar to that described in the studies listed above and that which also appears in the major data processing textbooks was the source of the topic listings in the survey instrument used in this survey.

Data processing instructional programs and data processing teachers. Except for the Bangs-Hillestad study, surveys of the existing data processing instructional programs were not apparent in the literature until the 1970's. These are the studies which most closely approximate the data collected in the current survey. Some of these findings are summarized here because of their similarity or contrast to the findings of this study.

Dostal (1970) surveyed 35 junior colleges in Illinois which were teaching data processing. She learned that data processing was primarily a separate course rather than a unit within a course. Those schools which did integrate data processing concepts into either clerical or management areas did not consider their preparation to be adequate. Instruction was considered to be of an introductory nature with three-fourths of the schools teaching unit record machine operation. All taught some programming language and systems analysis. Specific occupational preparation was considered to be in the programming area. The higher level languages were taught (Cobol, Fortran, Basic) plus symbolic or assembler languages. With respect to the qualifications of the teachers in these programs, it was concluded that institutions of higher learning appear not to be able to provide the type of preparation needed. Most teachers prepared themselves for teaching these courses through means other than classroom courses.

Reynolds (1971) also surveyed teachers in the junior colleges of Illinois. His findings parallel Dostal's. Attending manufacturers' schools, work experience, on-the-job training, and programmed instruction were the most frequent avenues used by teachers to secure specific data processing background for teaching. Over 91 percent of these postsecondary teachers had data processing work experience. While most teachers were being secured from industry, still it was concluded that to be employable as a full-time data processing teacher, the minimum requirements were a master's degree, work experience in data processing, and course work in accounting. He concluded further that there was a need on the part of current data processing teachers for graduate-level courses in business data processing.

Burgess (1972) focused his attention on secondary data processing programs in Georgia. In contrast with the postsecondary offerings and teaching staff cited above, approximately half of the business education teachers in Burgess' study had no experience in teaching data processing or were in their first year of instruction. Data processing content was more often a unit or a section of another business course rather than a separate course. Larger schools had more equipment, and keypunch training was the primary occupational program. The languages taught most frequently, if at all, were Cobol and Basic.

Smith (1974) confirmed these findings. Through national random sampling of 750 high schools (the number of responses was not given in the summary of this study), he also learned that data processing is frequently a unit of instruction within another business course. Of the total responding schools, only 39 percent offered instruction in data processing and 19.4 percent had one-year programs. If a complete course was offered, it was typically called "Introduction to Data Processing." The three most frequently taught languages were again Fortran, Cobol and Basic. The major problems were lack of equipment and an apparent lack of systematic preparation and upgrading of data processing teachers.

In a master's study in 1971, Moyer also concluded that there was little comprehensive or cooperative planning for high school data processing programs. This judgment came from surveying Oregon high schools having 1000 or more students and authorities in data processing instruction. He further confirmed that data processing courses fall into three categories. For general education purposes, an introduction to data processing course may be available. For college preparatory purposes, and often in the mathematics department, the programming languages Basic and Fortran are taught. For vocational preparation, keypunch training is available.

Paulus (1972) surveyed data processing teachers in Illinois and members of the Society for Automation in Business Education (SABE) to determine the extent to which the concepts taught by teachers in their classes were related to those concepts judged essential for inclusion in an introduction to data processing course. He also sought to determine the extent to which the concepts taught by data processing teachers were related to their own educational preparation to teach these essential concepts. He concluded that essential concepts were included in high school courses when teachers have been exposed to these concepts in their own college preparation for teaching. He further concluded that colleges are doing a less-than-adequate job of exposing teachers to these essential concepts. Unfortunately, the responses to his questionnaire were 28 percent for the SABE members and 37 percent for Illinois high school teachers.

In seeking to analyze the personnel and educational requirements of data processing employees and the college curricula designed to meet these requirements, Pollack (1973) surveyed both business firms and 2- and 4-year colleges by questionnaire. Some of her findings were that schools were generally nine years behind industry in providing data processing instruction and that they were playing an insufficient role in preparing students for this part of the business world. Their equipment was older than that of business, and business committees played a minor role in establishing or updating any of the data processing courses or curricula. In general, the 2-year college approximated the needs and content required by principal employers for programmers. The 4-year colleges were judged to have a scientific emphasis that was theoretical rather than practical.

Overton (1973) followed a similar approach of surveying both businesses and heads of departments of community colleges and technical institutes which taught data processing in North Carolina. His findings included a description of the jobs available to graduates and their educational prerequisites. While he judged the schools to be adequately preparing students for entry-level data processing jobs, the demand for data processing personnel was considered by data processing managers to exceed that which the technical institutes and community colleges could supply.

Alexander (1973) took a slightly different approach from the above studies and looked solely at the "environmental and educational characteristics" of secondary data processing teachers. For comparative purposes the teachers were divided into three groups: those who were teaching a unit of instruction on data processing, those who were teaching a course in data processing without equipment, and those who were teaching a course in data processing with equipment. From a total mailing of 1428 questionnaires to high school teachers, an initial response of 936 (77 percent) yielded 398 (43 percent) useable responses from business teachers who were teaching data processing. Because of the similarity of this study to the portions of the Alexander survey which determined teacher background characteristics and further instructional needs in data processing, some of the specific findings of the Alexander study are listed below:

1. Less than half of the schools in the United States have a teacher who teaches methods and concepts about the automatic processing of data.

2. The younger teacher, one with less than ten years of experience, tends, more often, to teach data processing with equipment than do those who have had more than ten years of experience.

3. The educational background of those teaching data processing was not significantly different from those not teaching data processing; therefore, it may be motivation rather than education which determines whether or not a business education teacher begins to teach in the area of data processing.

4. Only one fourth of all respondents who received information regarding classes, seminars, etc., took advantage of the educational opportunities in data processing.

5. Few secondary schools have a formal data processing course or courses available in the curriculum where equipment is available for "hands-on" experience.

6. Those teaching a course in data processing with equipment tended to teach more often in three-year secondary or area vocational schools.

7. Less than one fifth of all respondents had taken a methods course in the teaching of data processing. The group with the highest percentage response were those teaching a course in data processing with equipment.

8. The majority of teachers who were teaching data processing in the secondary schools had more than five years of experience at the secondary level in the area of business education. But, they had less than five years of teaching experience in data processing.

9. More individuals who were teaching a course in data processing with equipment had taken formal education courses to prepare themselves for the teaching of data processing than had those in the other three teaching categories.

10. Financial resources had the highest percentage of response as an unfavorable factor in the teaching of data processing other than accessibility of machines.

11. The majority of teachers of data processing had no work experience in data processing. Of those who did, the highest incidence of response was for accounting firms and educational facilities.

12. The highest percentage response for having never taught shorthand came from those teaching a course in data processing with equipment.

13. Typewriting was being taught by the majority of business teachers regardless of their status as a data processing teacher.

14. Very few individuals had ever taught math. This corresponds with the findings that very few individuals had majored in math either in their undergraduate or graduate programs.

15. Those involved in the teaching of data processing at the secondary level had not received instruction in the major topics which are recommended by the literature to be taught.

16. A significantly higher percentage of those teaching a course in data processing with equipment had received training on various pieces of unit record equipment, computer console operation, random access devices, paper-tape equipment, computer logic and theory, introduction to systems, and computer numbering systems than had those teaching a unit in data processing or a course in data processing with no equipment.

17. College was the major source of training for the various areas of training or instruction in data processing.

18. Equipment manufacturing schools and on-the-job training were also important sources of training for those teaching a course in data processing with equipment.

19. More individuals were qualified to teach Cobol and Fortran than the other languages listed. RPG and Machine Language were the third and fourth ranking languages that teachers of data processing were qualified to teach.

20. Typewriting was the only high school course receiving over sixty percent response as being of benefit in the teaching of data processing.

Development and evaluation of specific instructional materials. The area receiving the least research attention, and probably one of the most important for determining the effectiveness of data processing instruction, is that of developing or comparing alternative instructional approaches for teaching data processing content. The absence of this kind of formal research might be due to the fact that up to the present time curriculum development for single schools has been accomplished through master's degree research papers.

Three studies completed at the University of Minnesota are of this type. Erickson (1973) developed and field tested a simulated project in data processing in which students processed actual business data from the school office. Two earlier studies by Kuenzi (1967) and Sullivan (1969) were also directed toward developing data processing instructional units for their schools.

An experimental study by Knedel (1970) sought to determine the effect of the sequence in which programming languages were taught on student achievement and attitudes.

The current study is not directed toward curriculum development, but rather toward identifying needs of teachers for instruction in appropriate methodologies for teaching data processing content. The lack of attention to instructional variables in the data processing research indicates that this is an area needing further attention.

PROCEDURES

The following section outlines the procedures followed in designing and conducting the survey to collect data describing the characteristics of data processing instructors and their needs for further preparation in the data processing area. Also included are the limitations of this survey.

Procedures

The questionnaire designed for this survey is included in Appendix A, pages 56-62. The general model used is similar to that used by Abelson (1972) in generating an instrument for use in revising an educational psychology course. Teachers were asked to rate themselves for their mastery of a given skill, their need to study it, its applicability to the teaching process, and the extent to which they felt it should be included in pre- or inservice training.

Thus, the current survey asked data processing teachers to provide three kinds of information. First, teacher background information was requested, including work and teaching experience, and the title of the course or courses each was teaching in addition to the data processing course. Also, descriptive information was collected regarding the course or courses in which data processing content was being taught. This included the title of the course(s), the length of the course in months, the primary textbook(s) for the course, and the data processing equipment available for instruction.

Next, in the second main section of the questionnaire, teachers were asked to react to various data processing topic areas. They were asked if they had had instruction on a topic and then if they thought they needed instruction on this topic. They were then asked to rank each topic according to its relative importance in their classes.

In the third main section of the questionnaire, teachers reacted to several teaching competencies or methodological areas in data processing. They were asked if they had had instruction in a given competency, if they thought they needed instruction in this competency, and to rank each competency according to its relative importance in their classes.

Three kinds of institutions were designated as those of interest for obtaining information about the data processing instructional program and data processing teacher needs: secondary schools, postsecondary technical institutes, and two-year community colleges in Minnesota and Wisconsin. Only Minnesota has two-year community colleges, and while there are two-year campuses of the University of Wisconsin in various locations of Wisconsin, only two-year vocational-technical institutes were included in the survey.

Questionnaires were sent to all postsecondary teachers in Minnesota and Wisconsin who could be identified through the State Supervisors in business education and through state staff directories in each state as data processing teachers. A questionnaire and an accompanying cover letter (see Appendix A, pages 56-63) were sent to 42 postsecondary teachers in Wisconsin and 26 postsecondary teachers in Minnesota. These questionnaires were mailed in December, 1973. Postcard follow-up reminders (see Appendix A, page 64) were sent to non-respondents one month after the initial questionnaire. Useable questionnaires were received from 29 teachers in Wisconsin technical institutes (69 percent) and 19 teachers in Minnesota technical institutes (81 percent). These data are summarized in Table 1, page 11.

Table 1

POSTSECONDARY QUESTIONNAIRES

MAILED AND RETURNED

Activity	Wisconsin Technical		Minnesota Technical		Minnesota Community College	
	n	%	n	%	n	%
Questionnaires Mailed	42	100.0	26	100.0	18	100.0
Questionnaires Returned	29	69.0	21	80.8	9	50.0
Useable Questionnaires	29	69.0	19	73.1	8	44.4

A questionnaire and cover letter were also sent to the 18 community colleges in Minnesota in February, 1974. Business department chairpersons were asked to forward the questionnaire to teachers who were teaching data processing content in any course. After one month, follow-up postcards were mailed to non-respondents. Completed questionnaires were returned by 9 teachers (50 percent). Of those 9, 8 were useable.

At the secondary level in both Wisconsin and Minnesota, it was not possible to determine in advance which schools offered data processing instruction. Because of the large number of high schools in each state, it was decided to send initial inquiries to only the larger schools to determine if a data processing program existed and if the school was willing to participate in the survey. In Minnesota, large high schools were designated as those with a total school enrollment of 2000 or more. In Wisconsin, the list of high schools in the state which was provided by the Wisconsin Department of Public Instruction gave only the size of the school's graduating class. In this case it was decided that a large high school was one in which the graduating class was 200 students or more.

Following these two decision rules for large high schools, letters (see Appendix A, page 65) were sent to business department chairpersons in each school asking for the name of the person or persons on their staff who taught data processing content in any course. These initial inquiries were sent to 123 persons in Wisconsin and 64 persons in Minnesota in January, 1974.

From these initial inquiries, postcard (see Appendix A, page 66) returns indicated whether or not data processing instruction was offered in the high school. One month after the initial letter mailings, postcard follow-ups were sent to non-respondents. As postcards were received from each high school indicating the existence of a data processing program and identifying the data processing teacher, questionnaires and cover letters (see Appendix A, pages 56-63) were mailed to the data processing teachers. In March, 1974, follow-up postcards were sent to all data processing teachers who had not returned a questionnaire. In the Minneapolis-St. Paul area, non-respondents were called on the telephone to ask for their cooperation in supplying the needed information.

Table 2, below, summarizes the questionnaire mailing and return data for the Minnesota and Wisconsin secondary schools.

Table 2

SECONDARY INITIAL INQUIRIES AND QUESTIONNAIRES

MAILED AND RETURNED

Activity	Minnesota		Wisconsin	
	n	%	n	%
Initial Inquiry to Schools	62	100.0	123	100.0
Data Processing Taught	28	45.2	67	54.5
Data Processing Not Taught	16	25.8	26	21.1
Total Returns	44	71.0	91	74.0
No Response	18	29.0	32	26.1
Questionnaires Mailed to Teachers	37	100.0	88	100.0
Returns	36	97.3	68	77.3
Useable Returns	34	91.9	63	71.5
No Response	3	8.1	20	22.7

Of 62 high schools in Minnesota, 28 schools identified teachers of data processing content (45 percent). A total of 44 schools (71 percent) returned the postcard. Because some schools identified more than one teacher of data processing, questionnaires and cover letters were mailed to 37 teachers. Of these 37 teachers, 36 returned a questionnaire (97 percent), 34 of which were useable.

Of 123 schools in Wisconsin, 67 (54 percent) indicated that data processing was taught. A total of 91 schools (74 percent) returned the postcard. Because some schools identified more than one data processing teacher, questionnaires and cover letters were mailed to 88 persons. Of these 88 persons, 68 returned the questionnaire (75 percent). Of these 68 questionnaires, 63 were useable.

Limitations

The following are judged to be the major limitations of this survey:

1. Findings are limited to data processing teachers in the states of Minnesota and Wisconsin.

2. Data processing programs and teachers in small secondary schools have been excluded.

3. Data processing programs and teachers may exist in the secondary schools which did not respond to the initial request for participation in the study. These were, therefore, excluded from the study, and their inservice instructional needs may be different from those teachers in schools which were willing to participate.

4. No attempt was made to determine if those teachers not responding to the questionnaire, after they had been identified as data processing teachers, were different from those teachers who did respond.

FINDINGS

The findings are reported in four sections for the three major categories of the survey: teacher background characteristics, program characteristics, content topics, and instructional methodologies.

Teacher Background Characteristics

The first set of data derived from the first major category of the survey solicited information on the background of the data processing teachers. Information was gathered pertaining to the degrees earned, work experience, and teaching experience of the teachers.

Degrees earned. Undergraduate degrees, including both majors and minors, are reported in Table 3, page 14.

At the high school level, for both Wisconsin and Minnesota, almost ninety percent of the data processing teachers have an undergraduate major in business education. Half of the Minnesota community college data processing instructors also have undergraduate majors in business education. The technical institutes, however, do not follow this pattern, with majors spread over a larger number of options. In Minnesota, the percent of majors in business education and in mathematics is the same--31.6. In Wisconsin, the major with the highest percent is mathematics. At any level, very few instructors have degrees in computer science, and there are very few teachers who do not have a degree in some field.

The highest degree earned by the responding data processing teacher is displayed in Table 4, page 15.

In every category except Minnesota technical institutes, the majority of teachers have master's degrees, ranging from 58.7 percent for Wisconsin high school instructors to 75.0 percent for Minnesota community colleges. At the Minnesota technical institutes, 57.7 percent of the instructors have the bachelor's degree, but not a master's degree. Few teachers have degrees beyond the master's degree.

For those data processing instructors with graduate degrees, graduate majors are shown in Table 5, page 15.

In all cases, except for Wisconsin technical institute instructors, the graduate degree was earned with a major in business education. Education was the graduate degree earned by the largest number of Wisconsin technical institute instructors. Noteworthy in all cases is the preponderance of degrees in education rather than in business administration or computer science.

Table 3

UNDERGRADUATE MAJORS AND MINORS OF DATA PROCESSING TEACHERS

Area	MN AVTI[a] (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Accounting										
Major	0	0	3	10.3	0	0	0	0	0	0
Minor	0	0	1	3.4	0	0	1	1.6	0	0
Bus Admin										
Major	2	10.5	6	20.7	2	5.9	5	7.9	0	0
Minor	1	5.3	4	13.8	0	0	1	1.6	0	0
Bus Educ										
Major	6	31.6	3	10.3	30	88.2	55	87.3	4	50.0
Minor	0	0	0	0	0	0	0	0	3	37.5
Computer Sci										
Major	1	5.3	1	3.4	0	0	0	0	0	0
Minor	1	5.3	1	3.4	0	0	1	1.6	0	0
Dist Educ										
Major	0	0	0	0	0	0	0	0	1	12.5
Minor	0	0	0	0	0	0	0	0	0	0
Economics										
Major	1	5.3	1	3.4	0	0	0	0	0	0
Minor	0	0	4	13.8	1	2.9	10	15.9	0	0
Humanities										
Major	1	5.3	1	3.4	0	0	0	0	0	0
Minor	3	15.8	4	13.8	14	41.2	18	28.6	1	12.5
Soc Sciences										
Major	0	0	2	6.9	0	0	0	0	1	12.5
Minor	3	15.8	0	0	0	0	3	4.8	2	25.0
Other (Math)										
Major	6	31.6	11	37.9	0	0	2	3.2	1	12.5
Minor	5	26.3	7	24.1	8	23.5	8	12.7	0	0
None										
Major	2	10.5	1	3.4	0	0	0	0	0	0
Minor	6	31.6	8	27.6	8	23.5	20	31.2	3	37.5
No Response										
Major	0	0	0	0	2	5.9	1	1.6	1	12.5
Minor	0	0	0	0	2	5.9	1	1.6	1	12.5

[a] Abbreviations are: Minnesota Area Vocational-Technical Institute; Wisconsin Vocational, Technical, and Adult Education; Minnesota and Wisconsin High School; and Minnesota Community College.

Table 4

HIGHEST DEGREE COMPLETED BY DATA PROCESSING TEACHERS

Degree	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
High School	2	10.5	1	3.4	0	0	0	0	0	0
Bachelor's	11	57.9	7	24.1	9	26.5	26	41.3	2	25.0
Master's	5	26.3	20	69.0	24	70.6	37	58.7	6	75.0
Specialist	1	5.3	0	0	1	2.9	0	0	0	0
Other	0	0	1	3.4	0	0	0	0	0	0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Table 5

GRADUATE MAJORS OF DATA PROCESSING TEACHERS

Area	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Bus Admin	0	0	2	6.9	2	5.9	2	3.2	0	0
Bus Educ	5	26.3	4	13.8	22	64.7	35	55.6	3	37.5
Compu Sci	0	0	3	10.3	0	0	4	6.3	0	0
Dist Educ	0	0	0	0	0	0	0	0	1	12.5
Education	0	0	8	27.6	2	5.9	2	3.2	1	12.5
Others	1	5.3	5	17.2	1	2.9	2	3.2	2	25.0
None	13	68.4	7	24.1	5	14.7	17	27.0	0	0
No Response	0	0	0	0	2	5.9	1	1.6	1	12.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Work experience. The number of years of data processing work experience acquired by the instructors is shown in Table 6, below.

Table 6

NUMBER OF YEARS OF DATA PROCESSING WORK EXPERIENCE OF DATA PROCESSING TEACHERS

Number of Years	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
None	2	10.5	4	13.8	28	82.4	52	82.5	5	62.5
0 - 3 yrs	6	31.6	12	41.4	3	8.8	11	17.5	1	12.5
4 - 5 yrs	2	10.5	5	17.2	3	8.8	0	0	2	25.0
6 -10 yrs	6	31.6	4	13.8	0	0	0	0	0	0
10+ yrs	3	15.8	4	13.8	0	0	0	0	0	0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Except for the technical institutes, a large majority of the instructors have had no data processing work experience. The median number of years of data processing work experience for Wisconsin technical institute instructors is 0-3, while the Minnesota technical institute instructors have a median of 4-5 years.

Table 7, page 17, shows the types of data processing work experience gained by those instructors having such experience.

The major type of data processing work experience for the technical institute instructors is as a programmer--57.9 percent in Minnesota and 69.0 percent in Wisconsin. No clear pattern emerges for the Minnesota community colleges, while at the high school level, the little work experience that exists is as a keypunch machine operator--8.8 percent in Minnesota and 9.5 percent in Wisconsin.

Most data processing instructors, at all levels, have work experience related to the office, while not directly involved with data processing. The number of years of such work experience is shown in Table 8, page 17.

Not including the non-respondents to this question, the median number of years of other related work experience is 0-3 years at all levels except for the Minnesota community colleges where the median is 4-5 years.

Table 7

TYPE OF DATA PROCESSING WORK EXPERIENCE OF DATA PROCESSING TEACHERS

Job Titles	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%[a]	n	%	n	%	n	%	n	%
Sys Anal	7	36.8	19	65.5	0	0	0	0	2	25.0
Programmer	11	57.9	20	69.0	1	2.9	2	3.2	2	25.0
Comp Op	6	31.6	6	20.7	1	2.9	3	4.8	1	12.5
Tape Lib	0	0	0	0	1	2.9	4	6.3	0	0
Unit Record Mach Oper	4	21.1	3	10.3	2	5.9	0	0	0	0
Key Punch Mach Oper	0	0	2	6.9	3	8.8	6	9.5	1	12.5
Other	6	31.6	5	17.2	2	5.9	4	6.3	1	12.5

[a] Percents do not total 100 because many instructors have more than one type of work experience, or because not all instructors have data processing work experience.

Table 8

NUMBER OF YEARS OF OTHER RELATED WORK EXPERIENCE OF DATA PROCESSING TEACHERS

Number of years	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
None	3	15.8	8	27.6	4	11.8	10	15.9	0	0
0 - 3 yrs	4	21.1	9	31.0	11	32.4	27	42.9	2	25.0
4 - 5 yrs	4	21.1	3	10.3	7	20.6	6	9.5	4	50.0
6 -10 yrs	2	10.5	2	6.9	5	14.7	2	3.2	1	12.5
10+ yrs	1	5.3	1	3.4	1	2.9	5	7.9	0	0
No Response	5	26.3	6	20.7	6	17.6	13	20.6	1	12.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

The specific type of other related work experience is shown in Table 9, below.

Table 9

TYPE OF OTHER RELATED WORK EXPERIENCE OF DATA PROCESSING TEACHERS

Job Areas	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%[a]	n	%	n	%	n	%	n	%
Accounting	5	26.3	9	31.0	13	38.2	17	27.0	5	62.5
Mktg	1	5.3	3	10.3	2	5.9	2	3.2	2	25.0
Secry	0	0	1	3.4	10	29.4	19	30.2	4	50.0
Mgt/Supr	7	36.8	6	20.7	7	20.6	13	20.6	3	37.5
Gen Clerical	4	21.1	2	6.9	18	53.0	29	46.0	3	37.5
Other	1	5.3	0	0	6	17.6	0	0	3	37.5

[a] Percents do not total 100 because many instructors have more than one type of work experience, or because not all instructors have other related work experience.

Except for experience in marketing, all other job areas are well-represented at all levels, except that the technical institute instructors do not have secretarial work experience. The job areas in which the instructors have the greatest amount of other related work experience are as follows: management for Minnesota technical institutes, 36.8 percent; accounting for Wisconsin technical institutes, 31.0 percent; general clerical for both Minnesota and Wisconsin high schools, 53.0 and 46.0 percent respectively; and accounting for Minnesota community colleges, 62.5 percent.

Teaching experience. Table 10, page 19, displays both the total number of years of teaching experience and the number of years of teaching experience related to data processing.

For total number of years of teaching experience, the mode is five years or less for both states' technical institutes and Wisconsin high schools; for Minnesota high schools, the mode is 16 years or more; and for Minnesota community colleges, the mode is six to ten years. The median for all groups is six to ten years, except for Minnesota high schools, where the median is 11-15 years.

Table 10

TEACHING EXPERIENCE OF DATA PROCESSING TEACHERS

Years Of Teaching Experience	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Total No. of Years										
5 or less	8	42.1	12	41.4	6	17.6	18	28.6	1	12.5
6 - 10	5	26.3	9	31.0	5	14.7	17	27.0	4	50.0
11- 15	6	31.5	6	20.7	11	32.4	14	22.2	1	12.5
16+	0	0	2	6.9	12	35.3	14	22.2	2	25.0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0
Years Teaching Data Processing										
3 or less	4	21.0	6	20.7	13	38.2	30	47.6	4	50.0
4 - 6	7	36.8	14	48.3	14	41.2	25	39.7	3	37.5
7 -10	4	21.0	7	24.1	6	17.6	4	6.3	0	0
11+	1	5.3	1	3.4	0	0	0	0	0	0
No Response	3	15.8	1	3.4	1	2.9	4	6.3	1	12.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Looking specifically at number of years of teaching data processing, the mode is four to six years for the technical institutes and Minnesota high schools, while it is three years or less for Wisconsin high schools and Minnesota community colleges. Ignoring non-respondents, the median is four to six years for all but Minnesota community colleges, where the median remains at three or less years.

To determine the types of teaching experiences teachers had in addition to data processing, respondents were asked to list the courses they were teaching. The courses being taught in addition to the data processing courses are listed in Table 11, page 20.

Table 11

COURSES BEING TAUGHT IN ADDITION TO DATA PROCESSING

Course Title	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%[a]	n	%	n	%	n	%	n	%
Acctg/Bkkp	1	5.3	1	3.4	13	38.2	18	28.6	3	37.5
Coop. OE	0	0	0	0	1	2.9	6	9.5	0	0
Gen Bus	0	0	1	3.4	0	0	4	6.3	0	0
Mgt	0	0	0	0	0	0	1	1.6	0	0
Model Office	0	0	0	0	0	0	1	1.6	0	0
Off/Secy Prac	0	0	0	0	9	26.5	13	20.6	3	37.5
Shorthand	0	0	0	0	0	0	10	15.9	3	37.5
Typing	0	0	0	0	24	70.6	31	49.2	4	50.0
Misc	8	42.1	5	17.2	24	70.6	26	41.3	0	0
None	6	31.5	14	48.3	1	2.9	6	9.5	0	0
No Response	8	42.1	11	37.9	2	5.9	8	12.7	2	25.0

[a] Percents do not total 100 because instructors may be teaching more than one course other than data processing.

Typewriting, followed by accounting/bookkeeping, is the course more likely to be taught by the high school teacher in both states, and the Minnesota community college instructor. Few Wisconsin technical institute instructors are likely to teach outside the data processing area, but those who do are likely to teach a course in the miscellaneous area. More Minnesota technical institute instructors are likely to teach outside the data processing field, but it also is most likely to be in the miscellaneous category.

Program Characteristics

The second set of data derived from the first major category of the survey solicited information on the characteristics of the data processing programs themselves. Information was gathered on: size of school, course title, availability of various data processing equipment, and textbooks used.

Size of school. School size for the respondents is shown in Table 12, below.

Table 12

SIZE OF SCHOOL

School Size	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
1- 499	1	5.3	1	3.4	0	0	0	0	1	12.5
500- 999	4	21.0	2	6.9	0	0	16	25.4	4	50.0
1000-1499	10	52.6	2	6.9	7	20.6	17	27.0	1	12.5
1500-1999	2	10.5	7	24.1	19	55.9	20	31.7	2	25.0
2000-2499	1	5.3	5	17.2	5	14.7	4	6.3	0	0
2500 & over	0	0	12	41.4	3	8.8	5	7.9	0	0
No Response	0	0	0	0	0	0	1	1.6	0	0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

In examining Table 12, it must be remembered that the high school sample was stratified so that only Minnesota schools having more than 1000 students were selected, along with Wisconsin schools having at least 200 students in the graduating class. Smaller high schools may include data processing instruction even though they are not shown in the table.

Course titles. The titles of the courses in which data processing is taught are presented in Table 13, page 22.

In the high schools of both states and in the Minnesota community colleges, the most commonly found course title is "Introduction to Data Processing." No other course title is used by fifty percent of the schools responding. The second most popular course in which data processing is taught is office/secretarial procedures in Minnesota high schools, accounting/bookkeeping in Wisconsin high schools, and Fortran programming in Minnesota community colleges, although this later figure is represented by only two schools.

The pattern changes significantly for the postsecondary technical institutes. In Minnesota, the major course title is Cobol programming (63.2 percent), closely followed by "Introduction to Data Processing" (52.6 percent)

Table 13

TITLE OF COURSE(S) IN WHICH DATA PROCESSING IS TAUGHT

Course Title	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%[a]	n	%	n	%	n	%	n	%
Intro to DP	10	52.6	26	89.7	24	70.6	35	55.6	8	100.0
Acctg/Bkkp	0	0	1	3.4	2	5.9	20	31.7	0	0
Off/Secy Prod	0	0	0	0	7	20.6	8	12.7	0	0
Adv DP	9	47.4	16	55.2	3	10.3	4	6.3	1	12.5
Keypunch	0	0	4	13.8	1	2.9	2	3.2	0	0
Mgt	0	0	0	0	0	0	0	0	0	0
Prog Cobol	12	63.2	23	79.3	0	0	5	7.9	1	12.5
Fortran	4	21.0	4	13.8	0	0	1	1.6	2	25.0
Assbl	7	36.8	14	48.3	0	0	0	0	1	12.5
RPG	5	26.3	3	10.3	0	0	0	0	1	12.5
Other	3	15.8	7	24.1	1	2.9	0	0	0	0
Typing	0	0	0	0	0	0	4	6.3	0	0
Other	11	57.9	5	17.2	3	10.3	8	12.7	0	0

[a] Percents do not total 100 because data processing may be offered in a number of courses within a school.

and "Advanced Data Processing" (47.4 percent). In addition, 57.9 percent of the schools offer data processing in courses with titles not included in the options provided. In Wisconsin, the major course offering is "Introduction to Data Processing" (89.7 percent), followed closely by Cobol programming (79.3 percent), "Advanced Data Processing" (55.2 percent), and Assembly programming (48.3 percent).

Textbooks in use. The textbooks in use for data processing instruction are listed in Appendix B, beginning with p. 67, in Tables 29 to 33. There is obviously a wide range of textbooks in use for teaching data processing, and few books have a substantial part of the market for their respective fields. For example, in the technical institutes, the manufacturers' manuals are widely used (57.9 percent in Minnesota and 89.7 percent in Wisconsin). In Minnesota, 42.1 percent use no textbook, but the next most common text is used by only 21.1 percent of the schools. The second most popular textbook in Wisconsin is used by only 10.3 percent of the schools.

In Minnesota high schools, the most commonly used textbook is an introductory data processing text which is used by 38.2 percent of the schools (Wanous, Wanous, Wagner, *Fundamentals of Data Processing*). The next most frequently used text and manufacturers' manuals are used by only 14.7 percent of the schools. In Wisconsin, the most frequently used text is an accounting text (Boynton, Swanson, Carlson, Forkner, *Century 21 Accounting*, used by 22.2 percent of the schools), followed by the most commonly used text in Minnesota (Wanous, Wanous, Wagner, *Fundamentals of Data Processing*, used by 18.8 percent of the schools). The next most commonly used text and no textbook occur 9 times, or in 14.1 percent of the schools.

In the Minnesota community colleges, no pattern emerges, with the two texts used most frequently being used by only two of the schools.

A complete alphabetic listing of all textbooks used by the respondents is given in Appendix C, pp. 72 to 77.

Equipment available. Tables 14 through 28 display the equipment available in the courses in which data processing is taught, along with their availability in other courses, and, for those schools without access to the equipment, the teachers' assessment of the utility of such equipment if it were to be made available to their students.

Table 14

AVAILABILITY OF DATA PROCESSING EQUIPMENT - KEYPUNCH

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	12	63.2	20	69.0	18	52.9	35	55.6	3	37.5
Available in Other Courses	0	0	2	6.9	4	11.8	1	1.6	0	0
Available in My Course & Other Courses	7	36.8	7	24.1	5	14.7	3	4.8	1	12.5
Not Available But Would Be Useful	0	0	0	0	6	17.6	17	27.0	2	25.0
Not Available & Not Necessary	0	0	0	0	0	0	4	6.3	2	25.0
No Response	0	0	0	0	1	2.9	3	4.8	0	0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

From Table 14, page 23, it is apparent that the majority of all types of schools have keypunch equipment available in their courses. For the technical institutes, the percent exceeds ninety.

Table 15, below, reveals that verifiers are not as readily available as keypunch machines, although a sizable majority of the technical institutes do have them available to students. The high schools and Minnesota community colleges are divided almost evenly between those who do not have verifiers available but would find them useful, and those who do not have them available and do not feel that they are necessary.

Table 15

AVAILABILITY OF DATA PROCESSING EQUIPMENT - VERIFIER

Status	MN AVTI (N=19		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	8	42.1	15	51.7	3	8.8	14	22.2	1	12.5
Available in Other Courses	1	5.3	5	17.2	2	5.9	1	1.6	0	0
Available in My Course & Other Courses	7	36.8	4	13.8	2	5.9	0	0	0	0
Not Available But Would Be Useful	0	0	1	3.4	11	32.4	19	30.2	3	37.5
Not Available & Not Necessary	2	10.5	3	10.3	11	32.4	20	31.7	3	37.5
No Response	1	5.3	1	3.4	5	14.7	9	14.3	1	12.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

The sorter is available in slightly more schools than is the verifier (see Table 16, p. 25). Again, a sizable majority of the technical institutes have sorters available, and, while none of the other three types of institutions have a majority of schools with sorters, the high schools come very close. In addition, if it is not available, the high schools feel that it would be useful to have such equipment. At the community college level, there is split opinion as to whether or not the sorter would be useful.

Table 16

AVAILABILITY OF DATA PROCESSING EQUIPMENT - SORTER

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	9	47.4	17	58.6	13	38.2	19	30.2	1	12.5
Available in Other Courses	1	5.3	4	13.8	2	5.9	2	6.9	0	0
Available in My Course & Other Courses	5	26.3	7	24.1	2	5.9	1	1.6	1	12.5
Not Available But Would Be Useful	2	10.5	0	0	8	27.6	25	39.7	3	37.5
Not Available & Not Necessary	2	10.5	1	3.4	4	11.8	10	15.9	3	37.5
No Response	0	0	0	0	5	14.7	6	9.5	0	0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

From Table 17, p. 26, it is apparent that only the Wisconsin technical institutes have a majority of institutions in which the interpreter is available to students. Neither the Minnesota technical institute teachers, nor the high school teachers, feel that the equipment is necessary. Once again, the community college teachers are split in their opinion as to the utility of the interpreter for instructional purposes.

The availability of the reproducer is shown in Table 18, p. 27. Once again, over half of the Wisconsin technical institutes have such equipment available, while close to fifty percent of the Minnesota technical institutes have a reproducer. Few of the high schools and community colleges have such equipment available. Of those technical institutes who do not have such equipment, both states have a majority of teachers indicating that it is not necessary. Likewise, the majority of the high school teachers do not feel that the reproducer is necessary. The community colleges continue their pattern of being split on whether or not the reproducer would be useful to their students.

Table 17

AVAILABILITY OF DATA PROCESSING EQUIPMENT - INTERPRETER

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	5	20.3	13	44.8	3	8.8	5	7.9	0	0
Available in Other Courses	1	5.3	4	13.8	2	5.9	0	0	0	0
Available in My Course & Other Courses	1	5.3	5	17.2	0	0	0	0	0	0
Not Available But Would Be Useful	2	10.5	0	0	7	20.6	13	20.6	3	37.5
Not Available & Not Necessary	6	31.6	7	24.1	15	44.1	32	50.8	3	37.5
No Response	4	21.0	0	0	7	20.6	13	20.6	2	25.0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Table 19, p. 28, shows that 65.4 percent of the Wisconsin technical institutes have a collator available, but very few of the other institutions do have. In fact, a majority of the Minnesota technical institute teachers indicated that they do not feel that the collator is necessary. Slightly more of the teachers who do not have a collator available in Wisconsin high schools feel that it is not necessary than feel that it would be useful. However, the Minnesota high school and community college instructors are evenly split on the instructional utility of the collator.

In no case is the tabulator available in the majority of institutions, as shown in Table 20, p. 29. Interestingly, however, a higher percent of the high schools have this piece of equipment available than do the Wisconsin technical institutes, and just about the same percent of high schools have the equipment as do the Minnesota technical institutes. A majority percentage of the technical institutes feels that the tabulator is not necessary, while a higher percent of the Wisconsin high schools feels the equipment would be useful than feel that it is not necessary. Again, the Minnesota

Table 18

AVAILABILITY OF DATA PROCESSING EQUIPMENT - REPRODUCER

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	6	31.6	11	37.9	5	14.7	6	9.5	0	0
Available in Other Courses	1	5.3	3	10.3	2	5.9	0	0	0	0
Available in My Course & Other Courses	2	10.5	4	13.8	1	2.9	0	0	1	12.5
Not Available But Would Be Useful	2	10.5	1	3.4	8	27.6	17	27.0	3	37.5
Not Available & Not Necessary	5	26.3	9	31.0	13	38.2	28	44.4	3	37.5
No Response	3	15.8	1	3.4	5	14.7	12	19.0	1	12.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

high school and community college instructors are evenly divided on the tabulator's instructional utility.

Tables 21, p. 30, and 22, p. 31, display the number of schools with in-school and off-premises computers available. A clear pattern of differences exists when comparing the data of the two tables--postsecondary technical institutes tend to have in-school computers, whereas high schools and community colleges tend to have off-premises computers when they are available at all. For those schools without in-school computers, both the Minnesota community colleges and the Wisconsin high schools feel that such computers would be useful. The Minnesota high schools are evenly divided on the necessity of having in-school computers. For those without off-premises computers, the majority of the technical institutes and the Minnesota high schools do not feel that they are necessary. Slightly more of the Wisconsin high school teachers feel that they would be useful than feel that they are not necessary.

Table 19

AVAILABILITY OF DATA PROCESSING EQUIPMENT - COLLATOR

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	1	5.3	11	37.9	4	11.8	2	3.2	0	0
Available in Other Courses	0	0	5	17.2	2	5.9	0	0	0	0
Available in My Course & Other Courses	0	0	3	10.3	1	2.9	0	0	0	0
Not Available But Would Be Useful	2	10.5	1	3.4	11	32.4	21	33.3	3	37.5
Not Available & Not Necessary	10	52.6	8	27.6	11	32.4	27	42.9	3	37.5
No Response	6	31.6	1	3.4	5	14.7	13	20.6	2	25.0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

There was a high percent of no response to this question by all categories, particularly affecting any conclusion related to the Minnesota community colleges.

The availability of in-school CRT (cathode ray tube) terminals is shown in Table 23, p. 32, while their availability off premises is shown in Table 24, p. 33. In all cases there is a high "no response," approaching one-third of the respondents. For those who did respond, no group of teachers has a sizable number who have such equipment available for their students. Judgment about the usefulness of the equipment if it were to be made available varies. Across all groups, the in-school CRT terminal is judged to be of more use than an off-premises terminal. In no case is the off-premises terminal judged to be useful more than it is judged to be not necessary. The in-school terminal is judged to be useful more often than it is judged to be not necessary by the Minnesota (36.8 percent compared with 21.0 percent) and Wisconsin (44.8 percent compared with 6.9 percent) technical institutes, and there is no difference in opinion for the Minnesota high school (23.5 percent) and community college (25.0 percent) groups. Only the Wisconsin

Table 20

AVAILABILITY OF DATA PROCESSING EQUIPMENT - TABULATOR

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	3	15.8	2	6.9	6	17.6	11	17.5	0	0
Available in Other Courses	1	5.3	2	6.9	3	8.8	2	3.2	0	0
Available in My Course & Other Courses	1	5.3	1	3.4	1	2.9	1	1.6	1	12.5
Not Available But Would Be Useful	1	5.3	0	0	11	32.4	19	30.2	3	27.5
Not Available & Not Necessary	10	52.6	19	65.5	11	32.4	18	28.6	3	27.5
No Response	3	15.8	5	17.2	2	5.9	12	19.0	1	12.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

high school group feels that the CRT terminal is not necessary (50.8 percent compared with 22.2 percent who feel that it would be useful).

The high "no response" rate continues in Tables 25, p. 34, and 26, p. 35, in which the availability of in-school and off-premises batch processing terminals is shown. In-school batch processing terminals are available in 36.9 percent of the Minnesota technical institutes, 16.9 percent of the Wisconsin technical institutes, and 14.7 percent of the Minnesota high schools. They are not available at all in the Wisconsin high schools or the Minnesota community colleges. In those schools that do not have the equipment available, the technical institutes and community colleges are about evenly divided on the utility of the in-school batch processing terminals, while the high schools do not feel that it is necessary.

The group with the largest availability of off-premises batch processing terminal equipment is the Minnesota technical institutes with 21.1 percent. In none of the groups, however, did a majority of those without the

Table 21

AVAILABILITY OF DATA PROCESSING EQUIPMENT - COMPUTER, IN SCHOOL

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	8	42.1	19	65.5	3	8.8	6	9.5	1	12.5
Available in Other Courses	0	0	1	3.4	3	8.8	2	3.2	1	12.5
Available in My Course & Other Courses	6	31.6	6	20.7	1	2.9	0	0	0	0
Not Available But Would Be Useful	4	21.1	1	3.4	11	32.4	24	38.1	3	37.5
Not Available & Not Necessary	0	0	0	0	11	32.4	18	28.6	0	0
No Response	1	5.3	2	6.9	5	14.7	13	20.6	3	37.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

equipment feel that it was necessary. Again, the largest group feeling that it would be useful is the Minnesota technical institutes, with 15.8 percent. The group with the highest percent of teachers feeling that it would not be necessary is Wisconsin high schools with 49.2 percent.

The final piece of equipment that availability was determined on was in-school and off-premises teletype terminals. Table 27, p. 36, which displays the availability of the in-school teletype terminals, shows that the high schools and Minnesota community colleges have this equipment available in far greater numbers than the technical institutes. In fact, none of the Minnesota technical institutes have such equipment available. In descending order, such equipment is available in all of the Minnesota community colleges, in 61.8 percent of the Minnesota high schools, in 34.4 percent of the Wisconsin technical institutes, and in 25.4 percent of the Wisconsin high schools. In every case, except for the Wisconsin technical institutes, the majority of those without the equipment do not feel that it is necessary.

Table 22

AVAILABILITY OF DATA PROCESSING EQUIPMENT - COMPUTER, OFF PREMISES

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	2	10.5	0	0	8	23.5	10	15.9	0	0
Available in Other Courses	0	0	2	6.9	10	29.4	4	6.3	2	25.0
Available in My Course & Other Courses	1	5.3	0	0	1	2.9	0	0	1	12.5
Not Available But Would Be Useful	3	15.8	4	13.8	3	8.8	18	28.6	1	12.5
Not Available & Not Necessary	6	31.6	9	31.0	5	14.7	16	25.4	1	12.5
No Response	7	36.8	14	48.3	7	20.6	15	23.8	3	37.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Few of the schools have off-premises teletype terminals available, and all groups except the Wisconsin technical institutes, in which there is split opinion, feel strongly that such equipment is not necessary for a data processing course.

Content Topics

The survey gathered information from data processing teachers relative to the instruction they had received on a number of data processing topics, on their assessment as to their continuing need for instruction on those topics, and the importance of those topics to the data processing classes being taught. The tabulations for each of these areas are included in Appendices D to F, containing Tables 34 to 44, pp. 78 to 100.

Table 23

AVAILABILITY OF DATA PROCESSING EQUIPMENT - CRT TERMINAL, IN SCHOOL

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	0	0	2	6.9	2	5.9	0	0	0	0
Available in Other Courses	0	0	4	13.8	4	11.8	2	3.2	0	0
Available in My Course & Other Courses	2	10.5	1	3.4	1	2.9	0	0	0	0
Not Available But Would Be Useful	7	36.8	13	44.8	8	23.5	14	22.2	2	25.0
Not Available & Not Necessary	4	21.0	2	6.9	8	23.5	32	50.8	2	25.0
No Response	6	31.6	7	24.1	11	32.4	15	23.8	4	50.0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Instruction received by teachers. Tables 34-36 show the detailed responses of teachers to the topics in which they have received instruction. This summary will include only highlights of the results of the tabulations.

At least half of the Minnesota technical institute data processing teachers have received instruction in all of the content topics listed except: Operation of several unit record machines (47.4 percent), Time sharing (47.4 percent), Records management (42.1 percent), Internal systems controls (36.8 percent) and Evaluating and installing systems (36.8 percent). Overall, the major area in which the greatest number of Minnesota technical institute data processing teachers have received training is basic computer concepts, in which the lowest percent is 84.2

The pattern for Wisconsin technical institute data processing teachers is similar to the Minnesota technical institutes, with the weakest major area being "Systems development and design." Specifically, the areas in which the Wisconsin technical institute teachers fall below fifty percent include:

Table 24

AVAILABILITY OF DATA PROCESSING EQUIPMENT - CRT TERMINAL, OFF PREMISES

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	0	0	1	3.4	1	2.9	1	1.6	0	0
Available in Other Courses	1	5.3	0	0	1	2.9	0	0	0	0
Available in My Course & Other Courses	1	5.3	1	3.4	1	2.9	0	0	0	0
Not Available But Would Be Useful	3	15.8	7	24.1	5	14.7	7	11.1	0	0
Not Available & Not Necessary	8	42.1	10	34.4	16	47.1	35	55.6	4	50.0
No Response	6	31.6	10	34.4	10	29.4	20	31.7	4	50.0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

Social impact of computers (34.5 percent), Records management (41.4 percent), Data base concepts (41.4 percent), Internal systems controls (44.8 percent), and Evaluating and installing systems (44.8 percent). Computer programming is the major area with the highest percent having had training--86.2 percent for each item in this category.

In comparing the instructional backgrounds of Minnesota and Wisconsin technical institute teachers item by item, each state has almost the same number of content topics in which its percent is higher than the percent for the other state. The data would thus suggest that the amount of training for the two states at the technical institute level is comparable.

The high school instructors have not had nearly as broad a background as the technical institute instructors in data processing content areas. Over half of the teachers in Minnesota have not received instruction in well over half of the topics, and in Wisconsin half of the teachers have not received instruction in almost half of the content areas. The Wisconsin

Table 25

AVAILABILITY OF DATA PROCESSING EQUIPMENT - BATCH PROCESSING TERMINAL, IN SCHOOL

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	5	26.3	3	10.3	1	2.9	0	0	0	0
Available in Other Courses	1	5.3	2	6.9	4	11.8	0	0	0	0
Available in My Course & Other Courses	1	5.3	0	0	0	0	0	0	0	0
Not Available But Would Be Useful	3	15.8	7	24.1	7	20.6	14	22.2	2	25.0
Not Available & Not Necessary	3	15.8	8	27.6	12	35.3	32	50.8	2	25.0
No Response	6	31.6	9	31.0	10	29.4	17	27.0	4	50.0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

high school teachers appear to have had instruction in more of the topics than is true for the Minnesota teachers, and thus may be better prepared for teaching data processing content. For both groups, the two major areas in which the fewest teachers have received training are Systems development and design, and Operating systems concepts. In both categories, almost every item has fewer than twenty-five percent of the teachers having received instruction. The strongest areas for both groups include Data processing history, Unit record concepts, and Basic computer concepts.

The Minnesota community college data processing teachers fall under fifty percent for all of the items in Systems development and design, and Operating systems concepts. In addition, they have fewer than half of the teachers having received instruction in Program debugging techniques, Program documentation, and Computer console operation. At least half of the instructors have received instruction in the major categories of: Data processing history, Social impact of computers, Computer applications, Unit record concepts, Computer programming, Basic computer concepts, and Information processing concepts. The community college instructors, as a group, thus appear to have a more extensive content background than either group of high school teachers but

Table 26

AVAILABILITY OF DATA PROCESSING EQUIPMENT -
BATCH PROCESSING TERMINAL, OFF PREMISES

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	1	5.3	1	3.4	3	10.3	1	1.6	0	0
Available in Other Courses	3	15.8	1	3.4	1	2.9	0	0	1	12.5
Not Available But Would Be Useful	3	15.8	3	10.3	1	2.9	6	9.5	0	0
Not Available & Not Necessary	5	20.3	13	44.8	14	41.2	31	49.2	3	37.5
No Response	7	36.8	11	37.9	15	44.1	25	39.7	4	50.0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

a less extensive background than either of the two groups of technical institute instructors.

Instruction needed by teachers. Tables 37 - 39 show the detailed responses of teachers to those content topics for which they feel they need additional instruction. Again, the summary that follows includes only highlights of the figures presented in the tables.

For only five items do over fifty percent of the Minnesota technical institute instructors feel they need instruction. In descending order, they include: Time sharing (73.7 percent), Data communications (57.9 percent), Records management (57.9 percent), Data base concepts (52.6 percent), and Internal systems controls (52.6 percent). Basically, these needs follow the areas in which the fewest teachers had received instruction.

Interestingly, given the fact that backgrounds are almost the same, the Wisconsin technical institute teachers identified more areas than their Minnesota counterparts in which they feel that they need more instruction. Almost all items in three major categories included almost fifty percent or more of the teachers. These categories are: Information processing concepts, Systems development and design, and Operating systems concepts.

Table 27

AVAILABILITY OF DATA PROCESSING EQUIPMENT - TELETYPE TERMINAL, IN SCHOOL

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	0	0	5	17.2	5	14.7	6	9.5	2	25.0
Available in Other Courses	0	0	4	13.8	12	35.3	8	12.7	3	37.5
Available in My Course & Other Courses	0	0	1	3.4	4	11.8	2	3.2	3	37.5
Not Available But Would Be Useful	5	26.3	12	41.4	2	5.9	14	22.2	0	0
Not Available & Not Necessary	7	36.8	2	6.9	3	10.3	21	33.3	0	0
No Response	7	36.8	5	17.2	8	23.5	12	19.0	0	0
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

The Minnesota high school teachers, surprisingly, identified only five topics for which fifty percent or more of the teachers indicated that they needed additional instruction. Again in descending order, these topics include: Input/output control systems (52.9 percent) and, at 50 percent for each, Random-access processing, Use of higher-level programming language, Use of machine-oriented programming language, and Program flowcharting. The Wisconsin high school teachers, on the other hand, identified eleven topics for which at least half of the teachers feel a need for additional instruction. As this difference is not anticipated from the data on the background instruction received by the teachers, it is not clear whether the Minnesota teachers received better instruction in the areas in which instruction had been received, or whether one group of teachers has a better feel for the vocational objectives of their students, or whether the Wisconsin teachers have a better perception of their own needs for additional instruction than have the Minnesota high school teachers. The major categories identified by the Wisconsin high school teachers include: Social impact of computers, Computer applications, Problem-solving tools, Computer programming, and Computer console operation.

Table 28

AVAILABILITY OF DATA PROCESSING EQUIPMENT - TELETYPE TERMINAL, OFF PREMISES

Status	MN AVTI (N=19)		WI VTAE (N=29)		MN H.S. (N=34)		WI H.S. (N=63)		MN CC (N=8)	
	n	%	n	%	n	%	n	%	n	%
Available in My Course	0	0	0	0	0	0	2	3.2	1	12.5
Available in Other Courses	1	5.3	0	0	3	10.3	3	4.8	0	0
Not Available But Would Be Useful	1	5.3	9	31.0	2	5.9	9	14.3	0	0
Not Available & Not Necessary	10	52.6	9	31.0	17	50.0	30	47.6	4	50.0
No Response	7	36.8	11	37.9	12	35.3	19	30.2	3	37.5
Total	19	100.0	29	100.0	34	100.0	63	100.0	8	100.0

The Minnesota community college instructors feel a need for instruction in the broad areas of: Problem-solving tools, Computer programming, and Information processing concepts. In addition, they feel a need for additional instruction in the specific content areas of: Business computer applications (62.5 percent), Records management (50.0 percent), and Organizing and processing computer files (50.0 percent).

Importance of topics to the data processing classes. Tables 40 - 44 detail the responses of teachers to the importance of the content topics listed as they apply to the data processing classes which they teach. Summary information follows.

In Minnesota technical institutes, none of the items listed are considered unimportant by at least half of the respondents. The item considered least important is the Operation of several unit record machines, for which 31.6 percent of the respondents marked "Not Important." The items considered "Essential" by at least 75 percent of the respondents include, in descending order: Use of higher-level programming language (89.5 percent), Business computer applications (84.2 percent), Program flowcharting (78.9 percent) and Program documentation (78.9 percent).

For the Wisconsin technical institutes, three items are considered unimportant by 30 percent of the respondents: Operation of several unit record machines (41.4 percent), Data processing history (31.0 percent), and Description of unit record machines (31.0 percent). In contrast to the Minnesota technical institutes, none of the items are considered "Essential" by at least 75 percent of the respondents. Program flowcharting (72.4 percent) and Use of higher-level programming language (72.4 percent) are the two topic areas considered most essential. This selection parallels the selection of the Minnesota technical institute instructors in order of importance.

The response pattern shifts drastically for the Minnesota high school programs. Every item in the major areas of Systems development and design, and Operating systems concepts is considered "Not Important" by at least 35 percent of the respondents. In addition, several items in these two categories are simply not familiar to the respondents. Operation of several unit record machines is also considered not to be important by 32.4 percent of the respondents. On the other hand, none of the items listed is considered "Essential" by even 60 percent of the respondents. The highest item is Operation of keypunch (52.9 percent) followed by a drop to 38.2 percent who identified Principles of unit record processing as essential.

A similar pattern of response follows in the Wisconsin high schools. Again, all items in the two major categories of Systems development and design, and Operating systems concepts were identified as "Not Important" by at least 30 percent of the respondents. The only other item included in this category is Computer console operation, marked by 34.9 percent of the respondents as "Not Important." Not one item is considered "Essential" by half of the respondents. The two highest ranking items are: Business computer applications (47.6 percent) and Operation of keypunch (34.9 percent). Thus, little difference in judgment exists between the Minnesota and Wisconsin high school teachers on the importance of the listed topics in their data processing classes.

Finally, if the "Not Familiar" and "Not Important" columns are combined, the Minnesota community colleges have many areas which half of the teachers have identified. These include the major categories of: Computer programming, Computer console operation, Information processing concepts, Systems development and design, and Operating systems concepts. Thus, this group of teachers has identified many more topics than any other group as either "Not Important" or "Not Familiar." Three individual items have been selected by at least 50 percent of the teachers as "Essential": Business computer applications (87.5 percent), Data processing history (50.0 percent), and Social impact of computers (50.0 percent).

It would appear, in summary, from the important items identified, that the objective of instruction in the technical institutes is vocational preparation at an advanced level, that it is vocational preparation at an entry level for the high schools, and that the objective for the community colleges is not vocationally-oriented but is directed towards a general understanding of data processing operations.

Teaching Competencies

Responses to questions related to the data processing teaching competencies of the respondents are displayed in Tables 45 - 55, pp. 100-132, in Appendices G - I. As before, summary data only will be included here.

Instructional background of respondents. Tables 45 - 47 display those competencies related to classroom instruction in which teachers have received instruction.

The technical institute instructors in neither state have much background in methodology as related to the data processing class. Of the 33 competencies listed, at least half of the Minnesota instructors have received instruction in only 8, while at least half of the Wisconsin teachers have received instruction in only 6.

For the Minnesota technical institute instructors, three major categories do not contain one item in which at least half of the teachers have received some instruction: Planning, Methodologies, and Facilities. The two lowest individual items are: Helping students who have reading problems (10.5 percent), and Relating the research to curriculum decisions (15.8 percent). The two areas in which most teachers have received instruction are: Developing a philosophy regarding the role of the teacher in the classroom (68.4 percent), and Developing unit instructional plans (63.2 percent).

The Wisconsin technical institute instructors also have three major categories in which no item was marked by half of the respondents: Methodologies, Student Evaluation, and Facilities. The lowest item for the Wisconsin instructors is: Helping students who have reading problems (10.3 percent). The highest items, both with 62.1 percent, are: Developing audio-visual materials, and Developing a philosophy regarding the role of the teacher in the classroom.

Overall, the number of categories in which more Minnesota than Wisconsin instructors indicated instruction received is the same as the number in which more Wisconsin than Minnesota teachers responded. On average, then, the teaching competency instruction received appears to be comparable, although there are differences on individual items.

At the high school level, a different picture exists. The Minnesota high school teachers appear to have a better background in instruction in teaching competencies related to data processing than any of the other groups, except for the Minnesota community colleges, with at least half of the teachers marking 11 of the items, while at least half of the Wisconsin group marked only 4 items.

The highest items for the Minnesota high school instructors occur in the major categories of Human Relations and Other (philosophy, professionalism, and keeping current). The highest item is: Developing a philosophy regarding the role of the teacher in the classroom (73.5 percent), while the lowest item, and the only one with less than 20 percent, is: Articulating data processing instruction with other educational institutions (8.8 percent).

The highest items for the Wisconsin teachers are the same as for the Minnesota teachers, with the highest response received for: Developing a philosophy regarding the role of the teacher in the classroom (58.7 percent). Three items received less than 20 percent response: Articulating data processing instruction with other educational institutions (12.7 percent), Cooperating with departments outside of business in the offering of data processing instruction (17.5 percent), and Helping students who have reading problems (17.5 percent).

Only five of the 33 competencies were marked by less than half of the Minnesota community college instructors: Integrating theoretical considerations with practical applications (25.0 percent), and, at 37.5 percent each, Articulating data processing instruction with other educational institutions, Relating the research to curriculum decisions, Making data processing practical rather than theoretical for students, and Helping students who have reading problems. Several items were marked by 75 percent of the respondents. By self-report, the Minnesota community college instructors, by far, have received the greatest amount of preparation in teaching competencies for data processing.

Instructional needs in teaching competencies. Tables 48 - 50 display the self-perceptions of data processing instructors as to their own needs for instruction in the various teaching competencies listed.

In spite of their almost equal response to background, the Minnesota technical institute instructors list six items in which at least half of them feel that additional instruction is needed, while the Wisconsin instructors list only two. The six listed by Minnesota are: Individualizing instruction for the needs of specific students, and Determining ways of keeping current within the area of data processing (both at 57.9 percent), and, all at 52.6 percent, Articulating data processing instruction with other educational institutions, Developing audio-visual materials, Planning for the acquisition of equipment in data processing, and Providing guidance to students as related to personal problems. For Wisconsin, the two items identified are: Individualizing instruction for the needs of specific students (58.6 percent), and Developing tests for achievement evaluation (51.7 percent). Several other items fall between forty and fifty percent of the respondents.

For Minnesota technical institute instructors, only one item falls below 20 percent: Developing a philosophy regarding the role of the teacher in the classroom (10.5 percent). Two items are below 20 percent for the Wisconsin technical institute instructors: Teaching data processing concepts with limited or no equipment (13.8 percent), and Providing students with the opportunity for supplemental learning (17.2 percent). Thus most items have been identified as instructional needs by at least 20 percent of the instructors. The implication of these findings may be that there is a need for inservice education on almost all of the topics, but that they must be presented in such a way as to permit choice on the part of the students as to which of the competencies they personally feel they need to develop.

The high school instructors have identified many more areas in which they feel a need for instruction. This is again interesting given the fact that the high school instructors in Minnesota have received so much stronger an instructional background in teaching competencies than have the technical institute instructors. High needs were expressed in the two major categories of Planning and Curriculum Development by both the Minnesota and Wisconsin high school instructors, in addition to individual items in all other categories except Human Relations and Other. One exception to this is the identification of: Determining ways of keeping current within the area of data processing, identified by 60.3 percent of the Wisconsin teachers as a need. The major needs of the Minnesota high school teachers are: Making data processing practical rather than theoretical for students (70.6 percent), and Determining the appropriate length of time to spend on any one subject (64.7 percent). The highest need areas for the Wisconsin teachers include: Making data processing practical rather than theoretical for students (69.8 percent), Integrating theoretical considerations with practical applications (68.3 percent), and Articulating data processing instruction with other educational institutions (68.3 percent). The item identified by the fewest teachers in Minnesota is: Developing professionalism as related to professional organizations and literature (20.6 percent), and in Wisconsin: Developing a philosophy regarding the role of the teacher in the classroom (31.7 percent). From the high responses to each item, it seems appropriate to conclude that the high school teachers of both states feel a need for inservice education in almost all of the items listed in the questionnaire.

Not surprisingly, given the responses on instructional background, the Minnesota community colleges identified few items in which additional instruction was felt to be needed, and most of those categories were identified by exactly half of the respondents. The only item identified by over half of the respondents is: Determining ways of keeping current within the area of data processing (67.5 percent), while each item in the major category of Student evaluation was marked by half of the respondents. Half of the respondents also marked: Making data processing practical rather than theoretical for students, and Integrating theoretical considerations with practical applications. One item received no response as to the need for instruction: Utilizing the library in instruction. Any inservice education planned for this group of respondents should be developed to address specific concerns identified herein as needed.

Importance of teaching competencies. Tables 51 - 55 contain the respondents' indications of the importance of each of the listed teaching competencies in their data processing classes.

For the Minnesota technical institutes, two items appear as "Essential" for over half of the respondents, at 52.6 percent: Making data processing practical rather than theoretical for students, and Determining ways of keeping current within the area of data processing. Only one item was identified as "Not Important" by at least 20 percent of the respondents: Relating research to classroom activities (21.1 percent).

The Wisconsin technical institute instructors identified the same two competencies as "Essential" as did the Minnesota instructors: Making data processing practical rather than theoretical for students (62.1 percent), and Determining ways of keeping current within the area of data processing (58.6 percent). In addition, over half of the Wisconsin instructors identified as "Essential": Being fair and objective in class (51.7 percent). In contrast to the Minnesota instructors, the Wisconsin instructors identified many items as being "Not Important" to at least 20 percent of the respondents: Teaching data processing concepts with limited or no equipment (44.8 percent), Helping students with reading problems (34.5 percent), Utilizing guest speakers effectively (31.0 percent), Developing daily lesson plans (24.1 percent), Providing guidance to students as related to personal problems (24.1 percent), Developing behavioral objectives for a data processing course (20.7 percent), Relating the research to curriculum decisions (20.7 percent), and Utilizing field trips effectively (20.7 percent). Any decisions related to inservice education should take into account not only the areas that have been identified as areas in which instruction is needed, but also the importance of the competency. Instruction should first be provided in those areas which have been identified as most important and for which teachers feel they need instruction.

The Minnesota high school teachers identified only one competency as "Essential" by at least half of the teachers: Making data processing practical rather than theoretical for students (50.0 percent). On the other hand, at least 20 percent of the teachers felt four items were "Not Important": Articulating data processing instruction with other educational institutions (26.5 percent), Utilizing the library in instruction (23.5 percent), and, at 20.6 percent each, Relating the research to curriculum decisions, and Helping students who have reading problems.

In Wisconsin high schools, no item was considered "Essential" by at least half of the teachers. The item receiving the greatest response is: Being fair and objective in class (44.4 percent). On the other hand, only two items were considered "Not Important" by at least 20 percent of the teachers, both by 20.6 percent of the teachers: Utilizing the library in instruction, and Developing professionalism as related to professional organizations and literature.

Twenty of the listed competencies are considered "Essential" by the Minnesota community college instructors. Three items were identified as "Essential" by 75.0 percent of the instructors: Making data processing practical rather than theoretical for students, Integrating theoretical considerations with practical applications, and Developing professionalism as related to professional organizations and literature. Three items were also considered "Not Important" by 25.0 percent of the respondents. These categories are: Cooperating with departments outside of business in the offering of data processing instruction, Articulating data processing instruction with other educational institutions, and Utilizing the library in instruction. It should be remembered, however, that, because of the small number of teachers in this group, 25.0 percent represents only two respondents.

CONCLUSIONS

The conclusions for the study are presented in the same four categories as used to present the findings: teacher background characteristics, program characteristics, content topics, and instructional methodologies.

Teacher Background Characteristics

1. High school data processing teachers in Minnesota and Wisconsin have undergraduate majors in business education. In Minnesota community colleges half of the teachers have undergraduate degrees in business education. In Minnesota technical institutes, the same percent of teachers have undergraduate degrees in mathematics and business education. In Wisconsin technical institutes, mathematics is the undergraduate major earned by the largest number of teachers. Few instructors have degrees in computer science, and most teachers have an undergraduate degree.

2. The majority of teachers have master's degrees, except in Minnesota technical institutes. For those teachers with graduate degrees, the field is business education for all instructors except Wisconsin technical institute instructors, whose major is education.

3. The high school and community college instructors do not have work experience in data processing. The Wisconsin technical institute instructors have a median of 0-3 years, while the Minnesota technical institute instructors have a median of 4-5 years of data processing work experience.

4. For those instructors with data processing work experience, the technical institute instructors are most likely to have experience as programmers, the high school instructors as keypunch machine operators, and no pattern exists for the community college instructors.

5. Data processing instructors at all levels have a median of 0-3 years of work experience related to the office, not including data processing, with the exception of Minnesota community colleges, where the median is 4-5 years. The areas represented by the largest percent in each type of institutions are: management for Minnesota technical institutes, accounting for Wisconsin technical institutes, general clerical for both Minnesota and Wisconsin high schools, and accounting for Minnesota community colleges.

6. The mode for the number of years of teaching experience is five years or less for the technical institutes and the Wisconsin high schools; for Minnesota high schools, the mode is 16 years or more; and for Minnesota community colleges, 6-10 years. The median for all groups is 6-10 years, except for Minnesota high schools, where the median is 11-15 years.

7. Number of years of data processing teaching experience is a mode of 4-6 years for the technical institutes and Minnesota high schools, and 3 years or less for Wisconsin high schools and Minnesota community colleges. The median is 4-6 years for all but Minnesota community colleges, which is 3 or less years.

8. The course most likely to be taught in addition to data processing is typewriting, followed by accounting/bookkeeping for the high school and community college teachers. The technical institute instructors are not likely to teach outside of data processing, but those who do teach in a miscellaneous area.

Program Characteristics

9. Data gathered in this study related to the size of the school are not meaningful for the high schools as that sample was selected on a stratified basis. For the technical institutes, the median size in Minnesota is 1,000-1,499, while in Wisconsin it is 2,000-2,499. The mode in Minnesota is the same as the median, while in Wisconsin, it is 2,500 and over. In the community colleges, the median and the mode are the same at 500-999.

10. In the high schools and the community colleges, the most commonly used course title is "Introduction to Data Processing." In Minnesota technical institutes, the major course title is "Cobol Programming," followed by "Introduction to Data Processing" and "Advanced Data Processing." Data processing is also offered in a number of courses whose titles were not included on the questionnaire. In Wisconsin technical institutes, the course titles, **in order, are** "Introduction to Data Processing," "Cobol Programming," "Advanced Data Processing," and "Assembly Programming."

11. A wide range of textbooks is used. In the technical institutes, the major text source is the manufacturers' manuals. In fact, a large number of the Minnesota technical institutes use no textbook at all. While many texts are used at the high school level, the most commonly used text in Minnesota high schools is Wanous, Wanous, and Wagner, Fundamentals of Data Processing. In Wisconsin, the most frequently used text is Boynton, Swanson, Carlson, and Forkner, Century 21 Accounting. No clear pattern exists for the community colleges.

12. Almost all schools have keypunch equipment available.

13. Most technical institutes have verifiers. Few high schools and community colleges do, and the schools in these categories not having the verifier are divided evenly on their utility were they to be made available.

14. A sizable majority of the technical institutes have sorters, and, while none of the other three types of institutions have a majority of schools with sorters, the high schools come very close. If it is not available, the high schools feel that it would be useful to have such equipment. At the community college, there is split opinion on its utility.

15. Only the Wisconsin technical institutes have a majority of institutions in which the interpreter is available. While there is again split opinion on its utility by community college teachers, the other groups all feel that this equipment is necessary.

16. Over half of the Wisconsin technical institutes have reproducers, while almost half of the Minnesota technical institutes do. Few of the high schools or community colleges have such equipment. Those who do not have the equipment do not feel that it is necessary.

17. Few of the schools have a collator, with the exception of the Wisconsin technical institutes, where a majority do have the equipment. The Minnesota high schools and community colleges are divided on the instructional utility of the collator, while the majority of the Minnesota technical institute teachers and Wisconsin high school teachers without the equipment feel that it is not necessary.

18. The tabulator is not available in the majority of institutions in any category. The technical institutes do not feel that the tabulator is necessary, the Wisconsin high schools feel that it would be useful, and the Minnesota high schools and community colleges are evenly divided.

19. The technical institutes tend to have in-school computers, whereas high schools and community colleges tend to have off-premises computers when they are available at all. The Wisconsin high schools and Minnesota community colleges feel that in-school computers would be useful, while the Minnesota high schools are divided on this question. On the other hand, the technical institutes and the Minnesota high schools do not feel that off-premises computers are necessary, while the Wisconsin high schools feel that they would be helpful.

20. No group has a sizable number of either in-school or off-premises cathode ray tube terminals available. The in-school terminal is judged to be of more use than an off-premises terminal. In all cases the majority of teachers judged the off-premises terminal as not necessary. The technical institutes feel that the in-school terminal would be useful, and the Minnesota high school and community college groups are evenly divided. The Wisconsin high school group feels that it is not necessary.

21. Batch processing terminals, either in-school or off-premises, are not available to the majority of any of the groups. In addition, none of the groups had a majority feeling that off-premises batch processing terminals were necessary. The technical institutes and community colleges are evenly divided on the utility of the in-school batch processing terminals, while the high schools do not feel that they are necessary.

22. All of the Minnesota community colleges and a high percent of the Minnesota high schools have in-school teletype terminals. However, in every case where the equipment is not available, except for the Wisconsin technical institutes, the majority of respondents feel that this equipment is not necessary. Few of the schools have off-premises teletype terminals, and, except for Wisconsin technical institutes, where there is divided opinion, all groups feel strongly that such equipment is not necessary.

Content Topics

23. The amount of background in data processing is comparable for Wisconsin and Minnesota technical institute instructors. The high school instructors have not had as extensive a background in data processing as the technical institute instructors. The Wisconsin high school teachers have had more content background than the Minnesota instructors. Strengths and weaknesses in content background are presented in the "Findings" section. The community college instructors have a more extensive content background than the high school instructors, but less extensive than the technical institute instructors.

24. Specific areas in which teachers feel they need instruction are presented in the "Findings" section. In general, the Minnesota technical institute instructors feel they have few needs, and these needs follow the areas in which the fewest teachers have received instruction. In spite of almost equal amounts of instructional background, the Wisconsin technical institute instructors identified more areas than their Minnesota counterparts. At the high school level, a similar pattern emerged, wherein the Wisconsin teachers identified several more need areas than did the Minnesota instructors. Such a difference may reflect a difference in quality of instruction previously received, a difference in self perception (perhaps an unconscious incompetence on the part of the Minnesota teachers), or a different view of the vocational objectives of their students. The identified needs of the Minnesota community college instructors is comparable to those identified by both groups of Wisconsin teachers.

25. The importance to the data processing class of various items is presented in detail in the "Findings" section of this report. Similarity in importance rankings exists between the two states at each level. In general, based on the items identified as important, it would appear that the objective of instruction in the technical institutes is vocational preparation at an advanced level, that it is vocational preparation at an entry level for the high schools, and that the objective for the community college is less on vocational objectives, but directed towards a general understanding of data processing operations.

Teaching Competencies

26. Developing a philosophy regarding the role of the teacher in the classroom is a competency that most teachers have been exposed to. The Minnesota community college group has the broadest background in having received instruction in teaching competencies, followed by the Minnesota high schools, the Minnesota technical institutes, the Wisconsin high schools, and the Wisconsin technical institutes.

27. Almost all of the items identified were listed as areas in which additional instruction was needed by at least 20 percent of the respondents. The needs identified by the high schools were far greater than the needs

identified by the technical institutes. The Minnesota technical institute instructors identified more areas of need than did the Wisconsin teachers (in spite of comparable background), and the high school instructors identified more areas of need than did the technical instructors (again, in spite of a much broader background in instructional competencies). Two items occurred high in almost all of the lists: Making data processing practical rather than theoretical for students, and determining ways of keeping current within the area of data processing. Articulating data processing instruction with other educational institutions, also appears high on several of the lists as an area in which instruction was needed. Few items were identified by the community college instructors.

28. Those areas identified as ones in which instruction is needed are also those items of greatest importance. Specifically, items occurring most frequently are: Making data processing practical rather than theoretical for students, and determining ways of keeping current within the area of data processing. The Minnesota and Wisconsin technical institute instructors identified about the same number of items as "Essential," but the Wisconsin instructors identified many more items than the Minnesota instructors as being "Not Important." The high school instructors generally rated all items as being less important than did the technical institute instructors. The Minnesota community college group, on the other hand, identified many more items as "Essential" than did either of the other four groups.

RECOMMENDATIONS

Two types of recommendations are made: those arising out of the findings of the survey and those related to a need for further research.

Recommendations Based on the Findings

1. Any inservice education offerings should be addressed to a specific level of instruction, and should not attempt to address a group composed of instructors from more than one type of institution.

2. Inservice education should be directed first to those areas which teachers have identified as being most important and for which teachers most feel they need instruction. As a result, the following are recommendations for preservice and inservice teacher education in data processing[1]:

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[1] The following are the decision rules applied for inclusion of an item: For preservice education, if the percent of teachers in either Minnesota or Wisconsin rating a topic either "Essential" or "Very Important" totaled at least 50 percent, it was included as a preservice need. For inservice education, if the percent of teachers in either Minnesota or Wisconsin rating a topic either "Essential" or "Very Important" totaled at least 50 percent, and also at least one-third of the teachers expressed a need for instruction in this area, it was included as an inservice need. Inservice programs should be designed to permit teachers to pursue only those areas in which they have a need.

(a) Inservice education needs of technical school data processing teachers in content topics:

Computer Applications: Business applications
Problem-Solving Tools: Systems flowcharting, Decision tables, Program debugging techniques, and Program documentation
Computer Console Operation
Basic Computer Concepts: Computer storage and addressing
Information Processing Concepts: Batch processing, Random-access processing, Time sharing, and Data communications
Systems Development and Design: Basic systems design considerations, Forms design, Records management, Organizing and processing computer files, Data base concepts, Systems documentation, Internal systems controls, and Evaluating and installing systems
Operating Systems Concepts: Libraries, Utility programs, Supervisory programs, Compilers, Input/output control systems

(b) Preservice education needs of technical school data processing teachers in content topics:

All of the topics in (a) above, plus the following:

Social Impact of Computer
Unit Record Concepts: Operation of keypunch
Problem-Solving Tools: Program flowcharting
Computer Programming: Use of machine-oriented language, Use of higher level language
Basic Computer Concepts: Components of the computer, Types of primary storage, Computer numbering systems, Types of secondary storage, and Input/output devices

(c) Inservice education needs of high school data processing teachers in content topics:

Social Impact of Computers
Computer Applications: Business applications, Non-business applications
Unit Record Concepts: Principles of unit record processing, Description of unit record machines and Operation of keypunch
Problem-Solving Tools: Systems flowcharting and Program flowcharting
Basic Computer Concepts: Components of computer, Types of primary storage, and Input/output devices

(d) Preservice education needs of high school data processing teachers in content topics:

All of the topics in (c) above

(e) Inservice education needs of community college data processing teachers in content topics:

Computer Applications: Business applications
Information Processing Concepts: Timesharing

(f) Preservice education needs of community college data processing teachers in content topics:

All of the topics in (e) above, plus the following:

History
Social Impact of the Computer
Unit Record Concepts: Principles of unit record processing, Description of unit record machines, and Operation of keypunch
Problem-Solving Tools: Program flowcharting

(g) Inservice education needs of technical school data processing teachers in teaching competencies:

Planning: Cooperating with departments outside of business in offering of data processing instruction, Determining the appropriate pace at which to present materials, and Determining the appropriate length of time to spend on any one subject
Curriculum Development: Developing behavioral objectives for a data processing course, Relating the research to curriculum decisions, Developing unit instructional plans, Developing daily lesson plans, Developing audio-visual materials, Evaluating instructional materials, including textbooks, audio-visual materials, etc., Making data processing practical rather than theoretical for students, and Integrating theoretical considerations with practical applications
Methodology: Providing students with the opportunity for supplemental learning, Determining the time and variety of activities so as to keep the class interesting, and Individualizing instruction for the needs of specific students
Student Evaluation: Preassessing student competencies, Developing tests for achievement evaluation, and Determining appropriate standards to be used in the classroom
Facilities: Planning for the acquisition of equipment in data processing
Human Relations: Providing guidance to students as related to personal problems and Developing good interpersonal relationships
Other: Determining ways of keeping current within the area of data processing

(h) Preservice education needs of technical school data processing teachers in teaching competencies:

All of the topics in (g) above, plus the following:

Planning: Organizing time so as to be well prepared for classroom instruction
Human Relations: Being fair and objective in class
Other: Developing a philosophy regarding the role of the teacher in the classroom and Developing professionalism as related to professional organizations and literature

Student Evaluation: Preassessing student competencies, Developing tests for achievement evaluation, and Determining appropriate standards to be used in the classroom
Facilities: Utilizing field trips effectively
Other: Developing professionalism as related to professional organizations and literature and Determining ways of keeping current within the area of data processing

(l) Preservice education needs of community college data processing teachers in teaching competencies:

All of the topics in (k) above, plus the following:

Planning: Cooperating with departments outside of business in the offering of data processing instruction, Organizing time so as to be well prepared for classroom instruction, Determining the appropriate pace at which to present materials, and Determining the appropriate length of time to spend on any one subject
Curriculum Development: Relating the research to curriculum decisions, Developing unit instructional plans, Developing daily lesson plans, and Evaluating instructional materials, including textbooks, audio-visual materials, etc.
Methodology: Helping students who have reading problems, Providing students with the opportunity for supplemental learning, Eliminating distracting mannerisms from classroom presentations, and Determining the time and variety of activities so as to keep the class interesting
Facilities: Utilizing the library in instruction and Teaching data processing concepts with limited or no equipment
Human Relations: Providing guidance to students as related to personal problems, Being fair and objective in class, and Developing good interpersonal relationships
Other: Developing a philosophy regarding the role of the teacher in the classroom

Recommendations for Further Research

1. Personnel in data processing should be surveyed relative to the importance they attribute to the content topics included in this survey for students receiving vocational preparation at the high school and postsecondary school levels, as well as those items which they feel every business student should acquire for general education purposes. The need for instruction on the equipment included in the present survey should also be determined from them.

2. Followup studies of graduates from data processing courses, to determine the success of their placement in data processing occupations, and their evaluation of their educational preparation for those occupations, would be useful in determining the value of various components of courses currently being offered.

3. A survey of the students currently enrolled in data processing would permit a comparison between their evaluation of the teachers' inservice needs with the teachers' self-report of needs. Supervisors of the teachers might also be consulted. The purpose of these two surveys would be to determine how accurately teachers can self-judge their needs.

(i) Inservice education needs of high school data processing teachers in teaching competencies:

Planning: Organizing time so as to be well prepared for classroom instruction, Determining the appropriate pace at which to present materials, and Determining the appropriate length of time to spend on any one subject

Curriculum Development: Developing behavioral objectives for a data processing course, Relating the research to curriculum decisions, Developing unit instructional plans, Developing daily lesson plans, Developing audio-visual materials, Evaluating instructional materials, including textbooks, audio-visual materials; etc., Making data processing practical rather than theoretical for students, and Integrating theoretical considerations with practical applications

Methodology: Relating research to classroom activities, Helping students who have reading problems, Providing students with the opportunity for supplemental learning, Eliminating distracting mannerisms from classroom presentations, Determining the time and variety of activities so as to keep the class interesting, Utilizing guest speakers effectively, and Individualizing instruction for the needs of specific students

Student Evaluation: Preassessing student competencies, Developing tests for achievement evaluation, and Determining appropriate standards to be used in the classroom

Facilities: Utilizing field trips effectively, Planning for the acquisition of equipment in data processing, and Teaching data processing concepts with limited or no equipment

Human Relations: Providing guidance to students as related to personal problems, Being fair and objective in class, and Developing good interpersonal relationships

Other: Developing professionalism as related to professional organizations and literature and Determining ways to keep current within the area of data processing

(j) Preservice education needs of high school data processing teachers in teaching competencies:

All of the topics in (i) above, plus the following:

Other: Developing a philosophy regarding the role of the teacher in the classroom

(k) Inservice education needs of community college data processing teachers in teaching competencies:

Planning: Articulating data processing instruction

Curriculum Development: Developing behavioral objectives for a data processing course, Developing audio-visual materials, Making data processing practical rather than theoretical for students, and Integrating theoretical considerations with practical applications

Methodology: Relating research to classroom activities, Utilizing guest speakers effectively, and Individualizing instruction for the needs of specific students

4. A survey of students currently enrolled in high school would determine those data processing topics in which they want instruction.

5. A survey of graduates from data processing courses would determine the ways they use their data instruction in other than vocational applications and in other than data processing occupations.

6. Another method of determining instructor needs would be to evaluate the knowledges, skills, and attitudes related to data processing topics possessed by business students.

7. If the above recommendations for research were carried out, these findings combined with the findings in this study could become the basis for a competency-based teacher education program in data processing.

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List of Appendices

		Pages
A.	Questionnaire and Accompanying Letters and Postcards	56-66
B.	Data Processing Textbooks in Use	67-71
C.	Alphabetic Listing of Data Processing Textbooks In Use	72-77
D.	Data Processing Content, Had Instruction	78-83
E.	Data Processing Content, Need Instruction	84-89
F.	Data Processing Content, Importance	90-99
G.	Data Processing Teaching Competencies, Had Instruction	100-108
H.	Data Processing Teaching Competencies, Need Instruction	109-117
I.	Data Processing Teaching Competencies, Importance	118-132

Appendix A

RETURN TO:

Dr. Gary N. McLean
Department of Business Education
270 Peik Hall
University of Minnesota
Minneapolis, MN 55455

SURVEY OF DATA PROCESSING TEACHER NEEDS

I. NAME ____

SCHOOL NAME ____________________________________

LOCATION ______________________________________

Questionnaire

SURVEY OF
DATA PROCESSING TEACHER NEEDS

Page 2

I. A. SIZE OF SCHOOL: ___ 1-499 ___ 1000-1499 ___ 2000-2499
___ 500-999 ___ 1500-1999 ___ 2500 and over

B. TYPE OF SCHOOL: ___ Secondary ___ Two-Year College

___ Post-Secondary Vocational-Technical

II. DATA PROCESSING INSTRUCTOR

A. Teaching Experience

Total Number of Years of Teaching: ___ 5 or less ___ 6-10 ___ 11-15 ___ 16+
Number of Years Teaching Data Processing: ___ 3 or less ___ 4-6 ___ 7-10 ___ 11+

B. Titles of Courses you are now teaching in addition to course(s) in which you are teaching data processing:

____

____

C. Educational Experience

Highest Degree Completed: ___ High School ___ Bachelor's ___ Master's
___ Specialist ___ Other ____________ (Specify)

Undergraduate Major: ____________________

Undergraduate Minor: ____________________

Graduate Major: ____________________

D. Work Experience

Data Processing Work Experience? ___ Yes ___ No
If Yes, Length of Time You Worked: ___ 0-3 Yrs. ___ 4-5 Yrs.
___ 6-10 Yrs. ___ 10+ Yrs.
If Yes, Job Title(s): ___ Systems Analyst ___ Unit Record Machine Operator
___ Programmer
___ Computer Operator ___ Key Punch Machine Operator
___ Tape Librarian
___ Other ____________ (Specify)

Other Related Work Experience? ___ Yes ___ No
If Yes, Length of Time You Worked: ___ 0-3 Yrs. ___ 4-5 Yrs.
___ 6-10 Yrs. ___ 10+ Yrs.
If Yes, Job Area(s): ___ Accounting ___ Management/Supervisory
___ Marketing ___ General Clerical
___ Secretarial ___ Other (Specify)
____

III. DATA PROCESSING COURSES OFFERED

A. For each course in which you are now teaching data processing, please supply the following:

Title of Course	Length in Months of Data Processing Instruction	Primary Textbook(s) (Use Back if Necessary)

B. Data Processing Equipment available to your students

Please check the equipment below as (1) available in your course(s); (2) available in other courses offered in your school; (3) not available, but would be useful; or (4) not available and not necessary.

	Available in My Course(s)	Available in Other Course(s)	Not Available But Would Be Useful	Not Available and Not Necessary
1. Keypunch				
2. Verifier				
3. Sorter				
4. Reproducer				
5. Interpreter				
6. Collator				
7. Tabulator				
8. Computer, in school				
9. Computer, off premises				
10. Teletype terminal, in school				
11. Teletype terminal, off premises				
12. CRT terminal, in school				
13. CRT terminal, off premises				
14. Batch-processing terminal, in school				
15. Batch-processing terminal, off premises				
16. Others (Please List)				

DATA PROCESSING CONTENT

DIRECTIONS: Please make three responses to each of the following topics; I - Whether or not you have received instruction on this topic; II - Whether or not you think you need to receive instruction on this topic; III - How important you think the topic is for your class(es). In making this third response:

If you consider the topic ESSENTIAL, circle E in the column;
If you consider the topic VERY IMPORTANT, circle VI in the column;
If you consider the topic SOMEWHAT IMPORTANT, circle SI in the column;
If you consider the topic NOT IMPORTANT, circle NI in the column;
If you are NOT FAMILIAR WITH THE TOPIC, circle NF in the column.

	I HAD INSTRUCTION ON THIS TOPIC		II NEED INSTRUCTION ON THIS TOPIC		III IMPORTANCE OF THIS TOPIC IN MY CLASS(ES)				
	YES	NO	YES	NO					
1. Data Processing History	___	___	___	___	E	VI	SI	NI	NF
2. Social Impact of Computers	___	___	___	___	E	VI	SI	NI	NF
3. Computer Applications									
a. Business applications	___	___	___	___	E	VI	SI	NI	NF
b. Non-business applications	___	___	___	___	E	VI	SI	NI	NF
4. Unit Record Concepts									
a. Principles of unit record processing	___	___	___	___	E	VI	SI	NI	NF
b. Description of unit record machines	___	___	___	___	E	VI	SI	NI	NF
c. Operation of keypunch	___	___	___	___	E	VI	SI	NI	NF
d. Operation of several unit record machines	___	___	___	___	E	VI	SI	NI	NF
5. Problem-Solving Tools									
a. Systems flowcharting	___	___	___	___	E	VI	SI	NI	NF
b. Program flowcharting	___	___	___	___	E	VI	SI	NI	NF
c. Decision tables	___	___	___	___	E	VI	SI	NI	NF
d Program debugging techniques	___	___	___	___	E	VI	SI	NI	NF
e. Program documentation	___	___	___	___	E	VI	SI	NI	NF
6. Computer Programming									
a. Use of machine-oriented language	___	___	___	___	E	VI	SI	NI	NF
b. Use of higher-level language	___	___	___	___	E	VI	SI	NI	NF

DATA PROCESSING CONTENT (Continued)

	I HAD INSTRUCTION OF THIS TOPIC		II NEED INSTRUCTION ON THIS TOPIC		III IMPORTANCE OF THIS TOPIC IN MY CLASS(ES)				
	YES	NO	YES	NO					
7. Computer console Operation	___	___	___	___	E	VI	SI	NI	NF
8. Basic Computer Concepts									
a. Components of computer	___	___	___	___	E	VI	SI	NI	NF
b. Types of primary storage	___	___	___	___	E	VI	SI	NI	NF
c. Computer number systems	___	___	___	___	E	VI	SI	NI	NF
d. Computer storage and addressing	___	___	___	___	E	VI	SI	NI	NF
e. Types of secondary storage	___	___	___	___	E	VI	SI	NI	NF
f. Input/output devices	___	___	___	___	E	VI	SI	NI	NF
9. Information Processing Concepts									
a. Batch processing	___	___	___	___	E	VI	SI	NI	NF
b. Random-access processing	___	___	___	___	E	VI	SI	NI	NF
c. Time sharing	___	___	___	___	E	VI	SI	NI	NF
d. Data communications	___	___	___	___	E	VI	SI	NI	NF
10. Systems Development and Design									
a. Basic systems design considerations	___	___	___	___	E	VI	SI	NI	NF
b. Forms design	___	___	___	___	E	VI	SI	NI	NF
c. Records management	___	___	___	___	E	VI	SI	NI	NF
d. Organizing and processing computer files	___	___	___	___	E	VI	SI	NI	NF
e. Data base concepts	___	___	___	___	E	VI	SI	NI	NF
f. Systems documentation	___	___	___	___	E	VI	SI	NI	NF
g. Internal systems controls	___	___	___	___	E	VI	SI	NI	NF
h. Evaluating and installing systems	___	___	___	___	E	VI	SI	NI	NF
11. Operating Systems Concepts									
a. Libraries	___	___	___	___	E	VI	SI	NI	NF
b. Utility programs	___	___	___	___	E	VI	SI	NI	NF
c. Supervisory programs	___	___	___	___	E	VI	SI	NI	NF
d. Compilers	___	___	___	___	E	VI	SI	NI	NF
e. Input/output control systems	___	___	___	___	E	VI	SI	NI	NF
12. Others (Please Specify)									
______________________	___	___	___	___	E	VI	SI	NI	NF
______________________	___	___	___	___	E	VI	SI	NI	NF
______________________	___	___	___	___	E	VI	SI	NI	NF

DATA PROCESSING TEACHING COMPETENCIES

DIRECTIONS: Please make three responses to each of the following teaching competencies: I - Whether or not you have received instruction in this competency; II - Whether or not you think you need instruction in this competency; and III - How important you think this competency is in your classes. In the third response,

If you consider the competency ESSENTIAL, circle a E in the column;
If you consider the competency VERY IMPORTANT, circle a VI in the column;
If you consider the competency SOMEWHAT IMPORTANT, circle a SI in the column;
If you consider the competency NOT IMPORTANT, circle a NI in the column;
If you are NOT FAMILIAR WITH THE COMPETENCY, circle a NF in the column.

	I HAD INSTRUCTION IN THIS COMPETENCY		II NEED INSTRUCTION IN THIS COMPETENCY		III IMPORTANCE OF THIS COMPETENCY IN MY CLASS(ES)
	YES	NO	YES	NO	
1. Planning					
a. Cooperating with departments outside of Business in the offering of data processing instruction.	___	___	___	___	E VI SI NI NF
b. Articulating data processing instruction with other educational institutions	___	___	___	___	E VI SI NI NF
c. Organizing time so as to be well prepared for classroom instruction	___	___	___	___	E VI SI NI NF
d. Determining the appropriate pace at which to present materials	___	___	___	___	E VI SI NI NF
e. Determining the appropriate length of time to spend on any one subject	___	___	___	___	E VI SI NI NF
2. Curriculum Development					
a. Developing behavioral objectives for a data-processing course	___	___	___	___	E VI SI NI NF
b. Relating the research to curriculum decisions	___	___	___	___	E VI SI NI NF
c. Developing unit instructional plans	___	___	___	___	E VI SI NI NF
d. Developing daily lesson plans	___	___	___	___	E VI SI NI NF
e. Developing audio-visual materials	___	___	___	___	E VI SI NI NF
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	___	___	___	___	E VI SI NI NF
g. Making data processing practical rather than theoretical for students	___	___	___	___	E VI SI NI NF
h. Integrating theoretical considerations with practical applications	___	___	___	___	E VI SI NI NF

DATA PROCESSING TEACHING COMPETENCIES (Continued)

	I HAD INSTRUCTION IN THIS COMPETENCY		II NEED INSTRUCTION IN THIS COMPETENCY		III IMPORTANCE OF THIS COMPETENCY IN MY CLASS(ES)
	YES	NO	YES	NO	
3. Methodologies					
a. Relating research to classroom activities	___	___	___	___	E VI SI NI NF
b. Helping students who have reading problems	___	___	___	___	E VI SI NI NF
c. Providing students with the opportunity for supplemental learning	___	___	___	___	E VI SI NI NF
d. Eliminating distracting mannerisms from classroom presentations	___	___	___	___	E VI SI NI NF
e. Determining the time and variety of activities so as to keep the class interesting	___	___	___	___	E VI SI NI NF
f. Utilizing guest speakers effectively	___	___	___	___	E VI SI NI NF
g. Individualizing instruction for the needs of specific students	___	___	___	___	E VI SI NI NF
4. Student Evaluation					
a. Preassessing student competencies	___	___	___	___	E VI SI NI NF
b. Developing tests for achievement evaluation	___	___	___	___	E VI SI NI NF
c. Determining appropriate standards to be used in the classroom	___	___	___	___	E VI SI NI NF
5. Facilities					
a. Utilizing the library in instruction	___	___	___	___	E VI SI NI NF
b. Utilizing field trips effectively	___	___	___	___	E VI SI NI NF
c. Planning for the acquisition of equipment in data processing	___	___	___	___	E VI SI NI NF
d. Teaching data processing concepts with limited or no equipment	___	___	___	___	E VI SI NI NF
6. Human Relations					
a. Providing guidance to students as related to personal problems	___	___	___	___	E VI SI NI NF
b. Being fair and objective in class	___	___	___	___	E VI SI NI NF
c. Developing good interpersonal relationships	___	___	___	___	E VI SI NI NF
7. Other					
a. Developing a philosophy regarding the role of the teacher in the classroom	___	___	___	___	E VI SI NI NF
b. Developing professionalism as related to professional organizations and literature	___	___	___	___	E VI SI NI NF
c. Determining ways of keeping current within the area of data processing	___	___	___	___	E VI SI NI NF
7.d. ______________________________	___	___	___	___	E VI SI NI NF

UNIVERSITY OF MINNESOTA
TWIN CITIES

Department of Business Education
Division of Vocational and Technical Education
Peik Hall
Minneapolis, Minnesota 55455

TO: Business Education Teachers of Data Processing

FROM: Judith J. Lambrecht, Assistant Professor of Business Education
Gary N. McLean, Associate Professor of Business Education

SUBJECT: Data Processing Questionnaire

As a teacher in the area of data processing, you have the experience and expertise needed to help us and other business teacher educators better meet your teaching needs. By taking a few minutes to complete the enclosed questionnaire, you can provide the information needed for planning course offerings and content at undergraduate, graduate and in-service levels.

We are interested in your evaluation of two areas of your data processing preparation; the content areas of data processing and the development of teaching competencies in this area. We are also interested in your evaluation of the importance of components within these two areas in the classes you are teaching. This information is being sought from selected teachers at both the secondary and post-secondary levels in Minnesota and Wisconsin.

You will not be personally identified with the completed questionnaire. Your name and your school name will be placed on a separate sheet so that your anonymity will be assured while permitting us to follow-up non-respondents.

Won't you take a few minutes now to complete the three short sections of the enclosed questionnaire. A return-addressed, stamped envelope is provided for your convenience.

Enclosures 2

Cover Letter

Have you overlooked the data processing questionnaire you received several weeks ago? As a teacher of data processing, your response is important to us. No one but you is in a better position to evaluate the importance of the various content areas of data processing and the competencies necessary in your teaching.

Won't you take a few moments now to complete and return the questionnaire?

Judith J. Lambrecht
Asst. Prof. of Business Education
Gary N. McLean
Assoc. Prof. of Business Education

Follow-Up Postcard

UNIVERSITY OF MINNESOTA
TWIN CITIES

Department of Business Education
Division of Vocational and Technical Education
Peik Hall
Minneapolis, Minnesota 55455

January 8, 1974

TO: Business Department Chairperson

FROM: Judith J. Lambrecht, Assistant Professor of Business Education
Gary N. McLean, Associate Professor of Business Education

SUBJECT: Identification of Data Processing Programs

Does your school offer a course in data processing or include data processing content in another business course? If you do, the teacher or teachers on your staff with this responsibility have the experience and expertise to help us and other business educators better meet your teaching needs.

We are now seeking to identify schools and teachers who offer data processing instruction and to ask their cooperation in responding to a short questionnaire. Your assistance can provide the information needed for planning course offerings and content at undergraduate, graduate and in-service levels. These teachers, however, and their schools will not be personally identified with the completed questionnaire.

Will you assist us by completing and returning the enclosed postcard? Please indicate whether or not your school offers data processing instruction in any part of your business curriculum. If you do have such course content available and are willing to participate in this survey, please supply the name(s) of the teacher(s) who teach this subject in your department. The card requires no postage and just a moment of your time.

Letter Requesting Identification of High School
Data Processing Teachers

SCHOOL ______________________________________

ADDRESS______________________________________
Street

____
City State Zip

____ NO, we do not offer data processing instruction.
____ YES, we DO offer data processing instruction.

The following person(s) teach data processing:

____

____

Postcard Identifying High School Data Processing Teachers

Appendix B

Table 29

DATA PROCESSING TEXTBOOKS USED BY MINNESOTA POSTSECONDARY TECHNICAL INSTITUTES

N = 19 Schools

Author and Title *	Frequency
Manufacturers' Manuals	11
No Textbook	8
Cashman, Shelly, Intro. to Computer Programming IBM System 360 Assembler Language	4
Awad, Business Data Processing	3
Clark, Gale, Gary, Business Systems and Data Processing Procedures	3
Hamming, Computers and Society	3
Prosser, Beldecos, Keypunch Practice	3
Shelly, Cashman, DOS Utilities for Assembly Language Programmers	3
Shelly, Cashman, Intro. to Computer Programming System 360 PL/1	3
Cashman, Keys, Data Processing and Computer Programming: A Modular Approach	2
Daniels, Yeates, Systems Analysis	2
Davis, Computer Data Processing	2
Feingold, Fundamentals of Cobol Programming	2
Kapur, IBM 360 Assembler Language Programming	2
Keys, Cashman, Intro. to Computer Programming: Basic Fortran IV	2
Murach, Business Data Processing and Computer Programming	2
Schnake, Data Processing Concepts	2
Shelly, Cashman, Intro. to Computer Programming: ANSI Cobol	2
Benice, Intro. to Computers and Data Processing	1
Cashman, Shelly, Advanced Assembly Language	1
Cashman, Shelly, IBM 360 and Assembler Language Work Book	1
Couger, Shannon, Fortran: A Beginner's Approach	1
Davis, Introduction to Electronic Computers	1
Elliott, Wasley, Business Information Processing Systems	1
Feingold, Introduction to Data Processing	1
Kapur, Programming in Standard Cobol	1
Mason, Statistical Techniques in Business and Economics	1
Sanders, Computers in Business: An Introduction	1
Sanders, Computers and Management: Text and Readings	1
Sass, Basic Programming for Business	1
Saxon, Basic Data Processing Mathematics	1
Shelly, Cashman, DOS Job Control for Assembler Language Programmers	1
Shelly, Cashman, DOS Job Control for Cobol Programmers	1
Shelly, Cashman, Operating System Job Control Language	1
Sprowls, Introduction to PL/1 Programming	1
Thomas, System 360 Programming	1
Wanous, Wanous, Hughes, Intro. to Automated Data Processing	1
Weiss, Computer Usage/Application	1

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* See Alphabetical Listing of all data processing textbooks for complete reference.

Table 30

DATA PROCESSING TEXTBOOKS USED BY
WISCONSIN POSTSECONDARY TECHNICAL INSTITUTES
N = 29 Schools

Author and Title *	Frequency
Manufacturers' Manuals	26
Cashman, *Intro. to Computer Programming System 360 Cobol*	3
Cashman, Keys, *Data Processing and Computer Programming: A Modular Approach*	3
No Textbook	2
Saxon, *Basic Data Processing Mathematics*	2
Shelly, Cashman, *Intro. to Computer Programming ANSI Cobol*	2
Shelly, Cashman, *Intro. to Computer Programming RPG*	2
Wanous, Wanous, *Automation Office Practice*	2
Wanous, Wanous, Wagner, *Fundamentals of Data Processing*	2
Wanous, Wanous, Wagner, *Introductory Data Processing--An Intensive Course*	2
Awad, *Business Data Processing*	1
Bux, *Keypunch Training Course*	1
Cashman, Fletcher, *IBM System 360 RPG Programming, Vol. I, Introduction*	1
Cashman, Keys, *Data Processing--A Text and Project Manual*	1
Clark, Gale, Gray, *Business Systems and Data Processing Procedures*	1
Data Processing Film Library	1
DOS for American National Standard Cobol	1
Ford, *Basic Fortran IV Programming*	1
Gleim, *Data Processing Mathematics*	1
Katzan, *Advanced Programming: Programming and Operating Systems*	1
Laurie, *Modern Computer Concepts*	1
Louden, *Programming the IBM 1130*	1
Marxer, *Elements of Data Processing*	1
McCameron, *Cobol Logic and Programming*	1
Programmer's Guide	1
Rice, Mayne, Deitz, *Business Mathematics for Colleges*	1
Shelly, Cashman, *DOS Job Control for Assembler Language Programmers*	1
Shelly, Cashman, *IBM System-360 Assembler Language Disk/Tape Advanced Concepts*	1
Shelly, Cashman, *IBM System-360 Cobol Disk/Tape Advanced Concepts*	1
Sprowls, *Introduction to PL/1 Programming*	1
Wanous, Wanous, Hughes, *Intro. to Automated Data Processing*	1
Vazsonyi, *Intro. to Electronic Data Processing*	1

* See Alphabetical Listing of all data processing textbooks for complete reference.

Table 31

DATA PROCESSING TEXTBOOKS USED BY
MINNESOTA HIGH SCHOOLS
N = 34 Schools

Author and Title *	Frequency
Wanous, Wanous, Wagner, Fundamentals of Data Processing	13
Manufacturers' Manuals	5
Wanous, Wanous, Automation Office Practice	5
No Textbook	4
Prosser, Beldecos, Keypunch Practice	4
Freeman, Hanna, Kahn, Weaver, Accounting 10/12	3
Claffey, Principles of Data Processing	2
Feingold, Introduction to Data Processing	2
Haas, Data Processing, Vol. I-IV	2
Stern, Stern, Cobol Programming	2
Wood, Computer, People, Data	2
Wood, You Are a Data Processor	2
Bohl, Computer Concepts	1
Boynton, Swanson, Carlson, Forkner, Century 21 Accounting	1
Buckingham, Automation	1
Colbert, Data Processing Concepts	1
Kahn, Business Data Processing	1
LaFave, Milbrandt, Garth, Problem Solving: The Computer Approach	1
Principles of Automatic Data Processing	1
Wanous, Wanous, Hughes, Intro. to Automated Data Processing	1

* See Alphabetical Listing of all data processing textbooks for complete reference.

Table 32

DATA PROCESSING TEXTBOOKS USED BY
WISCONSIN HIGH SCHOOLS
N = 63 Schools

Author and Title *	Frequency
Boynton, Swanson, Carlson, Forkner, *Century 21 Accounting*	14
Wanous, Wanous, Wagner, *Fundamentals of Data Processing*	12
Hass, *Data Processing, Vol. I-IV*	9
No Textbook	9
Freeman, Hanna, Kahn, Weaver, *Accounting 10/12*	8
Wanous, Wanous, *Automation Office Practice*	4
Wanous, Wanous, Wagner, *Introductory Data Processing--An Intensive Course*	4
Manufacturers' Manuals	3
Robichaud, *Understanding Modern Business Data Processing*	3
Kahn, *Business Data Processing*	2
Murach, *Standard Cobol*	2
An IBM 1130 Fortran Primer	1
Archer, Brecker, Frakes, Stewart, *General Office Practice*	1
Awad, *Business Data Processing*	1
Benice, *Modern Business Data Processing*	1
Bux, *Keypunch Training Course*	1
Bux, *Sorter and Tabulator Training Kit*	1
Cashman, *Introduction to Computer Programming System 360 Cobol*	1
Healy, DeBruzzi, *Basic Fortran IV Programming: Self-Instructional Manual and Text*	1
Huffman, Stewart, Schneider, *General Recordkeeping*	1
Levy, *Punched Card Data Processing*	1
Murach, *Principles of Business Data Processing*	1
Prosser, Beldecos, *Keypunch Practice*	1
Sanders, *Computers in Business: An Introduction*	1
Shelly, Cashman, *IBM System-360 Cobol Disk/Tape Advanced Concepts*	1
Shelly, Cashman, *Introduction to Computer Programming ANSI Cobol*	1
Spitzbarth, *Basic Cobol Programming: Self-Instructional Manual*	1
Wanous, Wanous, Hughes, *Introduction to Automated Data Processing*	1
Wingate, Samson, *Retail Merchandising*	1

* See Alphabetical Listing of all data processing textbooks for complete reference.

Table 33

DATA PROCESSING TEXTBOOKS USED BY
MINNESOTA COMMUNITY COLLEGES
N = 8 Schools

Author and Title *	Frequency
Vazsonyi, Intro. to Electronic Data Processing	2
Wanous, Wanous, Hughes, Intro. to Automated Data Processing	2
Awad, Business Data Processing	1
Brightman, Luskin, Tilton, Data Processing for Decision Making	1
Chapin, Computers: A Systems Approach	1
Davis, Management Information Systems	1
Feingold, Fundamentals of Cobol Programming	1
Kapur, IBM 360 Assembler Language Programming	1
Kushner, Zucker, RPG: Language & Techniques	1
Nolan, Fortran IV Computing and Applications	1
Robichaud, Understanding Modern Business Data Processing	1
Schnake, Data Processing Concepts	1
Stern, Stern, Orilia, Business Data Processing Systems	1
Sweeney, The Use of Computers in Accounting	1
Wu, Business Programming in Fortran IV	1

* See Alphabetical Listing of all data processing textbooks for complete reference.

Appendix C

Alphabetic Listing of All Data Processing Textbooks Used in High Schools and Postsecondary Institutions in Minnesota and Wisconsin

1. *An IBM 1130 Fortran Primer*. IBM Publication, no date available.

2. Archer, F. C., Brecker, R. F., Frakes, J. C., and Stewart, J. R. *General Office Practice*, Third Edition. New York: McGraw-Hill Book Company, 1968.

3. Awad, E. M. *Business Data Processing*, Third Edition. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971.

4. Benice, D. D. *Introduction to Computers and Data Processing*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1970.

5. Benice, D. D. *Modern Business Data Processing*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1973.

6. Bohl, M. *Computer Concepts*. Chicago: Science Research Associates, 1971.

7. Boynton, L. D., Swanson, R. M., Carlson, P. A., and Forkner, H. L. *Century 21 Accounting*. Cincinnati, Ohio: South-Western Publishing Co., 1972.

8. Brightman, R. W., Luskin, B. J., and Tilton, T. *Data Processing for Decision Making*. New York: The Macmillan Company, 1968.

9. Buckingham, W. *Automation*. New York: Harper and Row, 1961.

10. Bux, W. E. *Keypunch Training Course*, Second Edition. Cincinnati, Ohio: South-Western Publishing Co., 1967.

11. Bux, W. E. *Sorter and Tabulator Training Kit*. Cincinnati, Ohio: South-Western Publishing Co., 1967.

12. Cashman, T. J. *IBM-360 Cobol Problem Text*. Anaheim, California: Anaheim Publishing Co., no date available.

13. Cashman, T. J. *Introduction to Computer Programming System 360 Cobol*. Anaheim, California: Anaheim Publishing Co., no date available.

14. Cashman, T. J., and Fletcher, D. A. *IBM System 360 RPG Programming, Volume 1, Introduction*. Anaheim, California: Anaheim Publishing Co., no date available.

15. Cashman, T. J., and Keys, W. J. *Data Processing--A Text and Project Manual*. New York: McGraw-Hill Book Company, 1967.

16. Cashman, T. J., and Keys, W. J. *Data Processing and Computer Programming: A Modular Approach*. New York: Harper and Row, 1971.

17. Cashman, T. J., and Shelly, G. B. *Advanced Assembly Language*. Anaheim, California: Anaheim Publishing Co., no date available.

18. Cashman, T. J., and Shelly, G. B. *IBM 360 and Assembler Language Work Book*. Anaheim, California: Anaheim Publishing Co., no date available.

19. Cashman, T. J., and Shelly, G. B. *Introduction to Computer Programming IBM System 360 Assembler Language*. Anaheim, California: Anaheim Publishing Co., no date available.

20. Chapin, N. *Computers: A Systems Approach*. Princeton, New Jersey: Van Nostrand Reinhold, 1971.

21. Claffey, W. J. *Principles of Data Processing*. Belmont, California: Dickinson Publishing Co., Inc., 1967.

22. Clark, F. J., Gale, R., and Gray, P. *Business Systems and Data Processing Procedures*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

23. Colbert, D. A. *Data Processing Concepts*. New York: Gregg Division, McGraw-Hill Book Company, 1968.

24. Couger, J. D., and Shannon, L. C. *Fortran: A Beginners Approach*. Homewood, Illinois: Richard D. Irwin, 1971.

25. *DOS for American National Standard Cobol*. GC 28-6394. IBM Publication, no date available.

26. Daniels, A., and Yeates, D. *Systems Analysis*. Palo Alto, California: Science Research Associates, 19[illegible].

27. *Data Processing Film Library*. Wakefield, Massachusetts: Edutronics Systems International, Inc., 1973.

28. Davis, G. B. *Computer Data Processing*, Second Edition. New York: McGraw-Hill Book Co., 1973.

29. Davis, G. B. *Introduction to Electronic Computers*, Second Edition. New York: McGraw-Hill Book Co., 1971.

30. Davis, G. B. *Management Information Systems*. New York: McGraw-Hill Book Co., 1974.

31. Elliott, C. O., and Wasley, R. S. *Business Information Processing Systems*, Third Edition. Homewood, Illinois: Richard D. Irwin, 1971.

32. Feingold, C. *Introduction to Data Processing*. Dubuque, Iowa: Wm. C. Brown Company Publishers, 1971.

33. Feingold, C. *Fundamentals of Cobol Programming*, Second Edition. Dubuque; Iowa: Wm. C. Brown Company Publishers, 1973.

34. Ford, D. H. *Basic Fortran IV Programming*, Revised Edition. Homewood, Illinois: Richard D. Irwin-Dorsey, 1974.

35. Freeman, M. H., Hanna, J. M., Kahn, G., and Weaver, D. H. Accounting 10/12, Second Edition. New York: Gregg Division, McGraw-Hill Book Co., 1973.

36. Gleim, G. A., and Farina, M. V. Data Processing Mathematics. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

37. Haas, R. W. Data Processing, Vol. I, II, III, and IV. Saint Paul: 3M Company, 1966.

38. Hamming, R. Computers and Society. New York: McGraw-Hill Book Co., 1972.

39. Healy, J., and DeBruzzi, J. Basic Fortran IV Programming: Self-Instructional Manual and Text. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc., 1968.

40. Huffman, H., Stewart, J. R., and Schneider, A. E. General Recordkeeping, Sixth Edition. New York: Gregg Division, McGraw-Hill Book Co., 1971.

41. Kahn, G. Business Data Processing. New York: Gregg Division, McGraw-Hill Book Co., 1966.

42. Kapur, G. K. IBM 360 Assembler Language Programming. New York: John Wiley & Sons, Inc., 1970.

43. Kapur, G. K. Programming in Standard Cobol. Chicago: Science Research Associates, 1973.

44. Katzan, H., Jr. Advanced Programming: Programming and Operating Systems. Princeton, New Jersey: Van Nos Reinhold, 1970.

45. Keys, W. J., and Cashman, T. J. Introduction to Computer Programming: Basic Fortran IV. Anaheim, California: Anaheim Publishing Co., 1972.

46. Kushner, M., and Zucker. RPG: Language and Techniques. New York: John Wiley & Sons, Inc., no date available.

47. LaFave, L. J., Milbrandt, G. D., and Garth, D. W. Problem Solving: The Computer Approach. New York: Gregg Division, McGraw-Hill Book Co., 1973.

48. Laurie, E. J. Modern Computer Concepts. Cincinnati, Ohio: South-Western Publishing Co., 1970.

49. Levy, J. Punched Card Data Processing. New York: McGraw-Hill Book Co., 1968.

50. Louden, R. K., and Ledin, Jr., C. Programming the IBM 1130, Second Edition. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

51. Marxer, E. Elements of Data Processing. Albany, New York: Delmar Publishers, 1971.

52. Manson, R. D. Statistical Techniques in Business and Economics. Homewood, Illinois: Richard D. Irwin, 1970.

53. McCameron, F. A. Cobol Logic and Programming, Revised Edition. Homewood, Illinois: Richard D. Irwin, 1970.

54. Murach, M. Principles of Business Data Processing. Chicago: Science Research Associates, 1970.

55. Murach, M. Standard Cobol. Chicago: Science Research Associates, 1971.

56. Murach, M. Business Data Processing and Computer Programming. Chicago: Science Research Associates, 1973.

57. Nolan, R. L. Fortran IV Computing and Applications. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc., 1971.

58. Principles of Automatic Data Processing. Park Ridge, Illinois: Data Processing Management Association, 1965.

59. Programmer's Guide. IBM Publication GC 28-6398. No date available.

60. Prosser, W. R., and Beldecos, H. J. Keypunch Practice. Baltimore, Maryland: H. M. Rowe, 1967.

61. Rice, L. A., Mayne, F. B., and Deitz, J. Business Mathematics for Colleges, Sixth Edition. Cincinnati, Ohio: South-Western Publishing Co., 1973.

62. Robichaud, B. Understanding Modern Business Data Processing. New York: Gregg Division, McGraw-Hill Book Company, 1966.

63. Rosenblatt, J., Editor. Computer Concepts, Vol. I and II. New York: ITT Educational Services, Inc., 1969.

64. Sanders, D. H. Computers in Business: An Introduction. New York: McGraw-Hill Book Company, 1972.

65. Sanders, D. H., Editor. Computers and Management: Text and Readings. New York: McGraw-Hill Book Co., 1970.

66. Sass, C. J. Basic Programming for Business. Boston: Allyn & Bacon, Inc., 1972.

67. Saxon, J. A. Basic Data Processing Mathematics. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

68. Schnake, M. A. Data Processing Concepts. New York: McGraw-Hill Book Co., 1973.

69. Shelly, G. B., and Cashman, T. J. DOS Job Control for Assembler Language Programmers. Anaheim, California: Anaheim Publishing Co., no date available.

70. Shelly, G. B., and Cashman, T. J. DOS Job Control for Cobol Programmers. Anaheim, California: Anaheim Publishing Co., no date available.

71. Shelly, G. B., and Cashman, T. J. DOS Utilities for Assembly Language Programmers. Anaheim, California: Anaheim Publishing Co., no date available.

72. Shelly, G. B., and Cashman, T. J. IBM System 360 Cobol Disk/Tape Advanced Concepts. Anaheim, California: Anaheim Publishing Co., 1971.

73. Shelly, G. B., and Cashman, T. J. IBM System 360 Assembler Language Disk/Tape Advanced Concepts. Anaheim, California: Anaheim Publishing Co., no date available.

74. Shelly, G. B., and Cashman, T. J. Introduction to Computer Programming ANSI Cobol. Anaheim, California: Anaheim Publishing Co., 1973.

75. Shelly, G. B., and Cashman, T. J. Introduction to Computer Programming System 360 PL/1. Anaheim, California: Anaheim Publishing Co., no date available.

76. Shelly, G. B., and Cashman, T. J. Introduction to Computer Programming RPG. Anaheim, California: Anaheim Publishing Co., no date available.

77. Shelly, G. B., and Cashman, T. J. Operating System Job Control Language. Anaheim, California: Anaheim Publishing Co., no date available.

78. Spitzbarth, L. M. Basic Cobol Programming: Self-Instructional Manual and Text. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc., 1970.

79. Sprowls, R. C. Introduction to PL/1 Programming. New York: Harper & Row, 1969.

80. Stern, N. B., and Stern, R. A. Cobol Programming. New York: John Wiley & Sons, Inc., 1970.

81. Stern, R. A., and Stern, N. B. Principles of Data Processing. New York: John Wiley & Sons, Inc., 1973.

82. Stern, R. A., Stern, N. B., and Orilia, L. Business Data Processing Systems. New York: John Wiley & Sons, Inc., 1972.

83. Sweeney, R. B. The Use of Computers in Accounting. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971.

84. Thomas, A. System 360 Programming. New York: Holt, Rinehart, 1971.

85. Vazsonyi, A. Introduction to Electronic Data Processing, Second Edition. Minneapolis: Honeywell, 1967.

86. Wanous, S..J., Wanous, E. E., and Hughes, A. F. Introduction to Automated Data Processing. Cincinnati, Ohio: South-Western Publishing Co., 1968.

87. Wanous, S. J., and Wanous, E. E. Automation Office Practice. Cincinnati, Ohio: South-Western Publishing Co., no date available.

88. Wanous, S. J., Wanous, E. E., and Wagner, G. E. *Fundamentals of Data Processing*. Cincinnati, Ohio: South-Western Publishing Co., 1971.

89. Wanous, S. J., Wanous, E. E., and Wagner, G. E. *Introductory Data Processing--An Intensive Course*, Second Edition. Cincinnati, Ohio: South-Western Publishing Co., 1973.

90. Weiss, E. A., Editor. *Computer Usage/Application*. New York: McGraw-Hill Book Co., 1970.

91. Wingate, J. W., and Samson, H. E. *Retail Merchandising*, Eighth Edition. Cincinnati, Ohio: South-Western Publishing Co., no date available.

92. Wood, M. *Computer, People, Data*. Cincinnati, Ohio: South-Western Publishing Co., 1972.

93. Wood, M. *You Are a Data Processor*. Cincinnati, Ohio: South-Western Publishing Co., 1972.

94. Wu, N. *Business Programming in Fortran IV*. Dubuque, Iowa: Wm. C. Brown Publishing Co., 1973.

Appendix D

Table 34

Data Processing Content
Had Instruction On This Topic

Content	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	11	57.9	8	42.1	0	0	18	62.1	11	37.9	0	0
2. Social Impact of Computers	10	52.6	8	42.1	1	5.3	10	34.5	18	62.1	1	3.4
3. Computer Applications												
a. Business applications	14	73.7	5	26.3	0	0	20	69.0	9	31.0	0	0
b. Non-business applications	10	52.6	6	31.6	3	15.8	16	55.2	11	37.9	2	6.9
4. Unit Record Concepts												
a. Principles of unit record processing	12	63.2	7	36.8	0	0	22	75.9	7	24.1	0	0
b. Description of unit record machines	10	52.6	9	47.4	0	0	21	72.4	7	24.1	1	3.4
c. Operation of keypunch	12	63.2	7	36.8	0	0	21	72.4	7	24.1	1	3.4
d. Operation of several unit record machines	9	47.4	10	52.6	0	0	18	62.1	10	34.5	1	3.4
5. Problem-Solving Tools												
a. Systems flowcharting	16	84.2	3	15.8	0	0	21	72.4	8	27.6	0	0
b. Program flowcharting	17	89.5	2	10.5	0	0	23	79.3	6	20.7	0	0
c. Decision tables	10	52.6	9	47.4	0	0	17	58.6	12	41.4	0	0
d. Program debugging techniques	16	84.2	3	15.8	0	0	24	82.8	5	17.2	0	0
e. Program documentation	14	73.7	5	26.3	0	0	24	82.8	5	17.2	0	0
6. Computer Programming												
a. Use of machine-oriented language	13	68.4	5	26.3	1	5.3	25	86.2	4	13.8	0	0
b. Use of higher-level language	16	84.2	2	10.5	1	5.3	25	86.2	4	13.8	0	0
7. Computer Console Operation	15	78.9	4	21.1	0	0	20	69.0	8	27.6	1	3.4

Data Processing Content
Had Instruction On This Topic

Content	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	17	89.5	1	5.3	1	5.3	23	79.3	5	17.2	1	3.4
b. Types of primary storage	16	84.2	2	10.5	1	5.3	21	72.4	7	24.1	1	3.4
c. Computer number systems	17	89.5	1	5.3	1	5.3	24	82.8	4	13.8	1	3.4
d. Computer storage and addressing	16	84.2	2	10.5	1	5.3	25	86.2	3	10.3	1	3.4
e. Types of secondary storage	16	84.2	2	10.5	1	5.3	22	75.9	6	20.7	1	3.4
f. Input/output devices	17	89.5	1	5.3	1	5.3	23	79.3	4	13.8	2	6.9
9. Information Processing Concepts												
a. Batch processing	14	73.7	4	21.1	1	5.3	24	82.8	4	13.8	1	3.4
b. Random-access processing	13	68.4	5	26.3	1	5.3	22	75.9	6	20.7	1	3.4
c. Time sharing	9	47.4	9	47.4	1	5.3	18	62.1	10	34.5	1	3.4
d. Data communications	12	63.2	6	31.6	1	5.3	19	65.5	9	31.0	1	3.4
10. Systems Development and Design												
a. Basic systems design considerations	11	57.9	6	31.6	2	10.5	19	65.5	9	31.0	1	3.4
b. Forms design	11	57.9	6	31.6	2	10.5	16	55.2	12	41.4	1	3.4
c. Records management	8	42.1	9	47.4	2	10.5	12	41.4	15	51.7	2	6.9
d. Organizing and processing computer files	13	68.4	4	21.1	2	10.5	18	62.1	10	34.5	1	3.4
e. Data base concepts	10	52.6	7	36.8	2	10.5	12	41.4	15	51.7	2	6.9
f. Systems documentation	12	63.2	5	26.3	2	10.5	15	51.7	13	44.8	1	3.4
g. Internal systems controls	7	36.8	10	52.6	2	10.5	13	44.8	15	51.7	1	3.4
h. Evaluating and installing systems	7	36.8	10	52.6	2	10.5	13	44.8	15	51.7	1	3.4
11. Operating Systems Concepts												
a. Libraries	13	68.4	5	26.3	1	5.3	19	65.5	9	31.0	1	3.4
b. Utility programs	16	84.2	2	10.5	1	5.3	19	65.5	9	31.0	1	3.4
c. Supervisory programs	15	78.9	3	15.8	1	5.3	19	65.5	9	31.0	1	3.4
d. Compilers	14	73.7	4	21.1	1	5.3	21	72.4	7	24.1	1	3.4
e. Input/output control systems	14	73.7	4	21.1	1	5.3	19	65.5	9	31.0	1	3.4

Table 35

Data Processing Content
Had Instruction On This Topic

Content	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	26	76.5	8	23.5	0	0	53	84.1	8	12.7	2	3.2
2. Social Impact of Computers	20	58.8	13	38.2	1	2.9	45	71.4	16	25.4	2	3.2
3. Computer Applications												
a. Business applications	24	70.6	9	26.5	1	2.9	51	81.0	11	17.5	1	1.6
b. Non-business applications	16	47.1	15	44.1	0	0	35	55.6	26	41.3	2	3.2
4. Unit Record Concepts												
a. Principles of unit record processing	29	85.3	5	14.7	0	0	52	82.5	10	15.9	1	1.6
b. Description of unit record machines	28	82.4	6	17.6	0	0	50	79.4	12	19.0	1	1.6
c. Operation of keypunch	31	91.2	3	8.8	0	0	49	77.8	13	20.6	1	1.6
d. Operation of several unit record machines	20	58.8	14	41.2	0	0	40	63.5	21	33.3	2	3.2
5. Problem-Solving Tools												
a. Systems flowcharting	16	47.1	17	50.0	1	2.9	42	66.7	20	31.7	1	1.6
b. Program flowcharting	22	64.7	11	32.4	1	2.9	47	74.6	15	23.8	1	1.6
c. Decision tables	11	32.4	18	52.9	5	14.7	20	31.7	36	57.1	7	11.1
d. Program debugging techniques	11	32.4	20	58.8	3	8.8	35	55.6	22	34.9	6	9.5
e. Program documentation	8	23.5	22	64.7	4	11.8	27	42.9	29	46.0	7	11.1
6. Computer Programming												
a. Use of machine-oriented language	17	50.0	15	44.1	2	5.9	43	68.3	19	30.2	1	1.6
b. Use of higher-level language	15	44.1	17	50.0	2	5.9	26	41.3	32	50.8	5	7.9
7. Computer Console Operation	8	23.5	25	73.5	1	2.9	19	30.2	41	65.1	3	4.8

Data Processing Content
Had Instruction On This Topic

Content	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	27	79.4	6	17.6	1	2.9	42	66.7	18	28.6	3	4.8
b. Types of primary storage	28	82.4	5	14.7	1	2.9	40	63.5	20	31.7	3	4.8
c. Computer number systems	26	76.5	7	20.6	1	2.9	41	65.1	19	30.2	3	4.8
d. Computer storage and addressing	27	79.4	6	17.6	1	2.9	39	61.9	20	31.7	4	6.3
e. Types of secondary storage	26	76.5	7	20.6	1	2.9	40	63.5	19	30.2	4	6.3
f. Input/output devices	27	79.4	5	14.7	2	5.9	45	71.4	14	22.2	4	6.3
9. Information Processing Concepts												
a. Batch processing	15	44.1	18	52.9	1	2.9	32	50.8	28	44.4	3	4.8
b. Random-access processing	12	35.3	20	58.8	2	5.9	33	52.4	27	42.9	3	4.8
c. Time sharing	18	52.9	15	44.1	1	2.9	33	54.4	27	42.9	3	4.8
d. Data communications	14	41.2	17	50.0	3	8.8	26	41.3	34	54.0	3	4.8
10. Systems Development and Design												
a. Basic systems design considerations	5	14.7	25	73.5	4	11.8	14	22.2	45	71.4	4	6.3
b. Forms design	8	23.5	22	64.7	4	11.8	21	33.3	39	61.9	3	4.8
c. Records management	11	32.4	20	58.8	3	8.8	20	31.7	40	63.5	3	4.8
d. Organizing and processing computer files	5	14.7	25	73.5	4	11.8	14	22.2	46	73.0	3	4.8
e. Data base concepts	4	11.8	27	79.4	3	8.8	13	20.6	47	74.6	3	4.8
f. Systems documentation	4	11.8	26	76.5	4	11.8	13	20.6	47	74.6	3	4.8
g. Internal systems controls	2	5.9	28	82.4	4	11.8	11	17.5	48	76.2	4	6.3
h. Evaluating and installing systems	3	8.8	27	79.4	4	11.8	7	11.1	52	82.5	4	6.3
11. Operating Systems Concepts												
a. Libraries	5	14.7	27	79.4	2	5.9	9	14.3	51	81.0	3	4.8
b. Utility programs	1	2.9	30	88.2	3	8.8	7	11.1	53	84.1	3	4.8
c. Supervisory programs	2	5.9	29	85.3	3	8.8	8	12.7	52	82.5	3	4.8
d. Compilers	8	23.5	24	70.6	2	5.9	16	25.4	44	69.8	3	4.8
e. Input/output control systems	5	14.7	26	76.5	3	8.8	15	23.8	45	71.4	3	4.8

Table 36

Data Processing Content
Had Instruction On This Topic

Content	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
1. Data Processing History	7	87.5	1	12.5	0	0
2. Social Impact of Computers	7	87.5	1	12.5	0	0
3. Computer Applications						
a. Business applications	8	100.0	0	0	0	0
b. Non-business applications	7	87.5	1	12.5	0	0
4. Unit Record Concepts						
a. Principles of unit record processing	7	87.5	1	12.5	0	0
b. Description of unit record machines	7	87.5	1	12.5	0	0
c. Operation of keypunch	7	87.5	1	12.5	0	0
d. Operation of several unit record machines	5	62.5	3	37.5	0	0
5. Problem-Solving Tools						
a. Systems flowcharting	5	62.5	3	37.5	0	0
b. Program flowcharting	8	100.0	0	0	0	0
c. Decision tables	4	50.0	3	37.5	1	12.5
d. Program debugging techniques	3	37.5	5	62.5	0	0
e. Program documentation	3	37.5	4	50.0	1	12.5
6. Computer Programming						
a. Use of machine-oriented language	7	87.5	1	12.5	0	0
b. Use of higher-level language	4	50.0	4	50.0	0	0
7. Computer Console Operation	2	25.0	6	75.0	0	0

Data Processing Content
Had Instruction On This Topic

Content	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
8. Basic Computer Concepts						
a. Components of computer	6	75.0	1	12.5	1	12.5
b. Types of primary storage	6	75.0	1	12.5	1	12.5
c. Computer number systems	6	75.0	1	12.5	1	12.5
d. Computer storage and addressing	6	75.0	1	12.5	1	12.5
e. Types of secondary storage	6	75.0	1	12.5	1	12.5
f. Input/output devices	6	75.0	1	12.5	1	12.5
9. Information Processing Concepts						
a. Batch processing	4	50.0	4	50.0	0	0
b. Random-access processing	4	50.0	3	37.5	1	12.5
c. Time sharing	6	75.0	2	25.0	0	0
d. Data communications	6	75.0	1	12.5	1	12.5
10. Systems Development and Design						
a. Basic systems design considerations	3	37.5	5	62.5	0	0
b. Forms design	2	25.0	6	75.0	0	0
c. Records management	4	50.0	4	50.0	0	0
d. Organizing and processing computer files	1	12.5	7	87.5	0	0
e. Data base concepts	2	25.0	6	75.0	0	0
f. Systems documentation	2	25.0	6	75.0	0	0
g. Internal systems controls	3	37.5	5	62.5	0	0
h. Evaluating and installing systems	2	25.0	6	75.0	0	0
11. Operating Systems Concepts						
a. Libraries	3	37.5	5	62.5	0	0
b. Utility programs	2	25.0	5	62.5	1	12.5
c. Supervisory programs	2	25.0	6	75.0	0	0
d. Compilers	2	25.0	6	75.0	0	0
e. Input/output control systems	2	25.0	6	75.0	0	0

Appendix E

Table 37

Data Processing Content
Need Instruction On This Topic

Content	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	1	5.3	16	84.2	2	10.5	4	13.8	18	62.1	7	24.1
2. Social Impact of Computers	3	15.8	14	73.7	2	10.5	8	27.6	14	48.3	7	24.1
3. Computer Applications												
a. Business applications	6	31.6	8	42.1	5	26.3	12	41.4	10	34.5	7	24.1
b. Non-business applications	9	47.4	8	42.1	2	10.5	10	34.5	13	44.8	6	20.7
4. Unit Record Concepts												
a. Principles of unit record processing	1	5.3	16	84.2	2	10.5	3	10.3	19	65.5	7	24.1
b. Description of unit record machines	1	5.3	15	78.9	3	15.8	3	10.3	19	65.5	7	24.1
c. Operation of keypunch	2	10.5	15	78.9	2	10.5	4	13.8	20	69.0	5	17.2
d. Operation of several unit record machines	2	10.5	15	78.9	2	10.5	3	10.3	20	69.0	6	20.7
5. Problem-Solving Tools												
a. Systems flowcharting	4	21.1	12	63.2	3	15.8	12	41.4	12	41.4	5	17.2
b. Program flowcharting	3	15.8	13	68.4	3	15.8	9	31.0	15	51.7	5	17.2
c. Decision tables	8	42.1	8	42.1	3	15.8	12	41.4	12	41.4	5	17.2
d. Program debugging techniques	5	26.3	11	57.9	3	15.8	10	34.5	14	48.3	5	17.2
e. Program documentation	6	31.6	10	52.6	3	15.8	11	37.9	13	44.8	5	17.2
6. Computer Programming												
a. Use of machine-oriented language	3	15.8	12	63.2	4	21.1	7	24.1	16	55.2	6	20.7
b. Use of higher-level language	5	26.3	10	52.6	4	21.1	5	17.2	18	62.1	6	20.7
7. Computer Console Operation	8	42.1	9	47.4	2	10.5	12	41.4	13	44.8	4	13.8

Data Processing Content
Need Instruction On This Topic

Content	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	5	26.3	11	57.9	3	15.8	6	20.7	17	58.6	6	20.7
b. Types of primary storage	4	21.1	12	63.2	3	15.8	6	20.7	17	58.6	6	20.7
c. Computer number systems	5	26.3	11	57.9	3	15.8	6	20.7	17	58.6	6	20.7
d. Computer storage and addressing	7	36.8	9	47.4	3	15.8	6	20.7	17	58.6	6	20.7
e. Types of secondary storage	6	31.6	10	52.6	3	15.8	6	20.7	17	58.6	6	20.7
f. Input/output devices	5	26.3	11	57.9	3	15.8	8	27.6	15	51.7	6	20.7
9. Information Processing Concepts												
a. Batch processing	4	21.1	10	52.6	5	26.3	7	24.1	16	55.2	6	20.7
b. Random-access processing	8	42.1	7	36.8	4	21.1	13	44.8	11	37.9	5	17.2
c. Time sharing	14	73.7	2	10.5	3	15.8	14	48.3	10	34.5	5	17.2
d. Data communications	11	57.9	5	76.3	3	15.8	19	65.5	5	17.2	5	17.2
10. Systems Development and Design												
a. Basic systems design considerations	5	26.3	11	57.9	3	15.8	15	51.7	8	27.6	6	20.7
b. Forms design	7	36.8	9	47.4	3	15.8	13	44.8	10	34.5	6	20.7
c. Records management	11	57.9	5	26.3	3	15.8	14	48.3	9	31.0	6	20.7
d. Organizing and processing computer files	8	42.1	8	42.1	3	15.8	16	55.2	8	27.6	5	17.2
e. Data base concepts	10	52.6	6	31.6	3	15.8	18	62.1	6	20.7	5	17.2
f. Systems documentation	8	42.1	8	42.1	3	15.8	14	48.3	10	34.5	5	17.2
g. Internal systems controls	10	52.6	6	31.6	3	15.8	15	51.7	9	31.0	5	17.2
h. Evaluating and installing systems	9	47.4	7	36.8	3	15.8	14	48.3	10	34.5	5	17.2
11. Operating Systems Concepts												
a. Libraries	9	47.4	6	31.6	4	21.1	13	44.8	11	37.9	5	17.2
b. Utility programs	8	42.1	7	36.8	4	21.1	15	51.7	9	31.0	5	17.2
c. Supervisory programs	9	47.4	6	31.6	4	21.1	14	48.3	10	34.5	5	17.2
d. Compilers	9	47.4	6	31.6	4	21.1	15	51.7	9	31.0	5	17.2
e. Input/output control systems	8	42.1	6	31.6	5	26.3	16	55.2	8	27.6	5	17.2

Table 38

Data Processing Content
Need Instruction On This Topic

Content	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	7	20.6	20	58.8	7	20.6	22	34.9	33	52.4	8	12.7
2. Social Impact of Computers	15	44.1	12	35.3	7	20.6	33	52.4	22	34.9	8	12.7
3. Computer Applications												
a. Business applications	15	44.1	13	38.2	6	17.6	37	58.7	15	23.8	11	17.5
b. Non-business applications	12	35.3	14	41.2	8	23.5	29	46.0	25	39.7	9	14.3
4. Unit Record Concepts												
a. Principles of unit record processing	7	20.6	18	52.9	9	26.5	28	44.4	26	41.3	9	14.3
b. Description of unit record machines	7	20.6	18	52.9	9	26.5	28	44.4	26	41.3	9	14.3
c. Operation of keypunch	7	20.6	18	52.9	9	26.5	24	38.1	30	47.6	9	14.3
d. Operation of several unit record machines	9	26.5	16	47.1	9	26.5	30	47.6	26	41.3	7	11.1
5. Problem-Solving Tools												
a. Systems flowcharting	16	47.1	13	38.2	5	14.7	37	58.7	15	23.8	11	17.5
b. Program flowcharting	17	50.0	11	32.4	6	17.6	34	54.0	18	28.6	11	17.5
c. Decision tables	13	38.2	11	32.4	10	29.4	29	46.0	23	36.5	11	17.5
d. Program debugging techniques	15	44.1	10	29.4	9	26.5	32	50.8	20	31.7	11	17.5
e. Program documentation	15	44.1	10	29.4	9	26.5	32	50.8	20	31.7	11	17.5
6. Computer Programming												
a. Use of machine-oriented language	17	50.0	11	32.4	6	17.6	38	60.3	17	27.0	8	12.7
b. Use of higher-level language	17	50.0	12	35.3	5	14.7	37	58.7	16	25.4	10	15.9
7. Computer Console Operation	14	41.2	17	50.0	3	8.8	35	55.6	20	31.7	8	12.7

Data Processing Content
Need Instruction On This Topic

Content	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	13	38.2	17	50.0	4	11.8	29	46.0	24	38.1	10	15.9
b. Types of primary storage	13	38.2	16	47.1	5	14.7	31	49.2	22	34.9	10	15.9
c. Computer number systems	14	41.2	15	44.1	5	14.7	31	49.2	22	34.9	10	15.9
d. Computer storage and addressing	15	44.1	15	44.1	4	11.8	29	46.0	22	34.9	12	19.0
e. Types of secondary storage	13	38.2	17	50.0	4	11.8	30	47.6	22	34.9	11	17.5
f. Input/output devices	14	41.2	16	47.1	4	11.8	32	50.8	21	33.3	10	15.9
9. Information Processing Concepts												
a. Batch processing	16	47.1	13	38.2	5	14.7	28	44.4	24	38.1	11	17.5
b. Random-access processing	17	50.0	14	41.2	3	8.8	29	46.0	23	36.5	11	17.5
c. Time sharing	14	41.2	14	41.2	6	17.6	29	46.0	23	36.5	11	17.5
d. Data communications	14	41.2	15	44.1	5	14.7	32	50.8	21	33.3	10	15.9
10. Systems Development and Design												
a. Basic systems design considerations	14	41.2	16	47.1	4	11.8	29	46.0	22	34.9	12	19.0
b. Forms design	11	32.4	19	55.8	4	11.8	27	42.9	25	39.7	11	17.5
c. Records management	15	44.1	16	47.1	3	8.8	26	41.3	24	38.1	13	20.6
d. Organizing and processing computer files	15	44.1	16	47.1	3	8.8	29	46.0	24	38.1	10	15.9
e. Data base concepts	15	44.1	17	50.0	2	5.9	24	38.1	27	42.9	12	19.0
f. Systems documentation	13	38.2	17	50.0	4	11.8	24	38.1	27	42.9	12	19.0
g. Internal systems controls	13	38.2	17	50.0	4	11.8	23	36.5	30	47.6	10	15.9
h. Evaluating and installing systems	11	32.4	19	55.8	4	11.8	23	36.5	30	47.6	10	15.9
11. Operating Systems Concepts												
a. Libraries	15	44.1	15	44.1	4	11.8	27	42.9	24	38.1	12	19.0
b. Utility programs	15	44.1	14	41.2	5	14.7	24	38.1	26	41.3	13	20.6
c. Supervisory programs	14	41.2	15	44.1	5	14.7	22	34.9	28	44.4	13	20.6
d. Compilers	15	44.1	15	44.1	4	11.8	24	38.1	26	41.3	13	20.6
e. Input/output control systems	18	52.9	11	32.4	5	14.7	28	44.4	22	34.9	13	20.6

Table 39

Data Processing Content
Need Instruction On This Topic

Content	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
1. Data Processing History	0	0	6	75.0	2	25.0
2. Social Impact of Computers	2	25.0	4	50.0	2	25.0
3. Computer Applications						
a. Business applications	5	62.5	1	12.5	2	25.0
b. Non-business applications	2	25.0	4	50.0	2	25.0
4. Unit Record Concepts						
a. Principles of unit record processing	1	12.5	6	75.0	1	12.5
b. Description of unit record machines	1	12.5	6	75.0	1	12.5
c. Operation of keypunch	2	25.0	4	50.0	2	25.0
d. Operation of several unit record machines	3	37.5	4	50.0	1	12.5
5. Problem-Solving Tools						
a. Systems flowcharting	3	37.5	4	50.0	1	12.5
b. Program flowcharting	2	25.0	4	50.0	2	25.0
c. Decision tables	5	62.5	1	12.5	2	25.0
d. Program debugging techniques	5	62.5	2	25.0	1	12.5
e. Program documentation	5	62.5	1	12.5	2	25.0
6. Computer Programming						
a. Use of machine-oriented language	5	62.5	1	12.5	2	25.0
b. Use of higher-level language	5	62.5	2	25.0	1	12.5
7. Computer Console Operation	3	37.5	4	50.0	1	12.5

Data Processing Content
Need Instruction On This Topic

Content	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
8. Basic Computer Concepts						
a. Components of computer	1	12.5	4	50.0	3	37.5
b. Types of primary storage	1	12.5	4	50.0	3	37.5
c. Computer number systems	1	12.5	4	50.0	3	37.5
d. Computer storage and addressing	1	12.5	4	50.0	3	37.5
e. Types of secondary storage	1	12.5	4	50.0	3	37.5
f. Input/output devices	2	25.0	3	37.5	3	37.5
9. Information Processing Concepts						
a. Batch processing	4	50.0	2	25.0	2	25.0
b. Random-access processing	4	50.0	1	12.5	3	37.5
c. Time sharing	3	37.5	2	25.0	3	37.5
d. Data communications	4	50.0	1	12.5	3	37.5
10. Systems Development and Design						
a. Basic systems design considerations	3	37.5	3	37.5	2	25.0
b. Forms design	3	37.5	2	25.0	3	37.5
c. Records management	4	50.0	1	12.5	3	37.5
d. Organizing and processing computer files	4	50.0	2	25.0	2	25.0
e. Data base concepts	3	37.5	2	25.0	3	37.5
f. Systems documentation	2	25.0	3	37.5	3	37.5
g. Internal systems controls	2	25.0	3	37.5	3	37.5
h. Evaluating and installing systems	2	25.0	3	37.5	3	37.5
11. Operating Systems Concepts						
a. Libraries	2	25.0	4	50.0	2	25.0
b. Utility programs	2	25.0	3	37.5	3	37.5
c. Supervisory programs	2	25.0	4	50.0	2	25.0
d. Compilers	2	25.0	4	50.0	2	25.0
e. Input/output control systems	2	25.0	4	50.0	2	25.0

Appendix F

Table 40

Data Processing Content
Importance of This Topic In My Class(es)

Content	Minnesota AVTI (N = 19)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	3	15.8	1	5.3	11	57.9	4	21.0	0	0	0	0
2. Social Impact of Computers	2	10.5	9	47.4	5	26.3	2	10.5	0	0	1	5.3
3. Computer Applications												
a. Business applications	16	84.2	2	10.5	1	5.3	0	0	0	0	0	0
b. Non-business applications	0	0	5	26.3	8	42.1	4	21.1	0	0	2	10.5
4. Unit Record Concepts												
a. Principles of unit record processing	0	0	3	15.8	12	63.2	4	21.1	0	0	0	0
b. Description of unit record machines	0	0	2	10.5	11	57.9	4	21.1	0	0	2	10.5
c. Operation of keypunch	5	26.3	9	47.4	5	26.3	0	0	0	0	0	0
d. Operation of several unit record machines	0	0	3	15.8	10	52.6	6	31.6	0	0	0	0
5. Problem-Solving Tools												
a. Systems flowcharting	12	63.2	5	26.3	1	5.3	0	0	0	0	1	5.3
b. Program flowcharting	15	78.9	2	10.5	1	5.3	0	0	0	0	1	5.3
c. Decision tables	7	36.8	5	26.3	3	15.8	3	15.8	1	5.3	0	0
d. Program debugging techniques	14	73.7	4	21.1	1	5.3	0	0	0	0	0	0
e. Program documentation	15	78.9	3	15.8	1	5.3	0	0	0	0	0	0
6. Computer Programming												
a. Use of machine-oriented language	7	36.8	6	31.6	5	26.3	1	5.3	0	0	0	0
b. Use of higher-level language	17	89.5	1	5.3	1	5.3	0	0	0	0	0	0
7. Computer Console Operation	10	52.6	8	42.1	1	5.3	0	0	0	0	0	0

Data Processing Content
Importance of This Topic In My Class(es)

Content	Minnesota AVTI (N = 19)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	10	52.6	7	36.8	1	5.3	0	0	0	0	1	5.3
b. Types of primary storage	9	47.4	6	31.6	2	10.5	1	5.3	0	0	1	5.3
c. Computer number systems	11	57.9	7	36.8	0	0	0	0	0	0	1	5.3
d. Computer storage and addressing	11	57.9	7	36.8	0	0	0	0	0	0	1	5.3
e. Types of secondary storage	9	47.4	8	42.1	1	5.3	0	0	0	0	1	5.3
f. Input/output devices	12	63.2	5	26.3	1	5.3	0	0	0	0	1	5.3
9. Information Processing Concepts												
a. Batch processing	10	52.6	6	31.6	1	5.3	0	0	0	0	2	10.5
b. Random-access processing	10	52.6	6	31.6	1	5.3	0	0	0	0	2	10.5
c. Time sharing	4	21.1	8	42.1	3	15.8	2	10.5	0	0	2	10.5
d. Data communications	9	47.4	6	31.6	2	10.5	0	0	0	0	2	10.5
10. Systems Development and Design												
a. Basic systems design considerations	6	31.6	10	52.6	2	10.5	0	0	0	0	1	5.3
b. Forms design	4	21.1	9	47.4	5	26.3	0	0	0	0	1	5.3
c. Records management	4	21.1	10	52.6	3	15.8	1	5.3	0	0	1	5.3
d. Organizing and processing computer files	8	42.1	10	52.6	0	0	0	0	0	0	1	5.3
e. Data base concepts	4	21.1	12	63.2	2	10.5	0	0	0	0	1	5.3
f. Systems documentation	8	42.1	8	42.1	2	10.5	0	0	0	0	1	5.3
g. Internal systems controls	4	21.1	10	52.6	4	21.1	0	0	0	0	1	5.3
h. Evaluating and installing systems	2	10.5	7	36.8	8	42.1	1	5.3	0	0	1	5.3
11. Operating Systems Concepts												
a. Libraries	8	42.1	7	36.8	3	15.8	0	0	0	0	1	5.3
b. Utility programs	9	47.4	9	47.4	0	0	0	0	0	0	1	5.3
c. Supervisory programs	7	36.8	9	47.4	1	5.3	1	5.3	0	0	1	5.3
d. Compilers	7	36.8	9	47.4	1	5.3	1	5.3	0	0	1	5.3
e. Input/output control systems	8	42.1	9	47.4	1	5.3	0	0	0	0	1	5.3

Table 41

Data Processing Content
Importance of This Topic In My Class(es)

Content	Wisconsin Post Secondary (N = 29)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	3	10.3	1	3.4	16	55.2	9	31.0	0	0	0	0
2. Social Impact of Computers	4	13.8	9	31.0	8	27.6	6	20.7	0	0	2	6.9
3. Computer Applications												
a. Business applications	20	69.0	7	24.1	1	3.4	0	0	0	0	1	3.4
b. Non-business applications	3	10.3	8	27.6	9	31.0	6	20.7	1	3.4	22	6.9
4. Unit Record Concepts												
a. Principles of unit record processing	4	13.8	6	20.7	11	37.9	8	27.6	0	0	0	0
b. Description of unit record machines	2	6.9	3	10.3	15	51.7	9	31.0	0	0	0	0
c. Operation of keypunch	7	24.1	6	20.7	10	34.5	6	20.7	0	0	0	0
d. Operation of several unit record machines	1	3.4	1	3.4	15	51.7	12	41.4	0	0	0	0
5. Problem-Solving Tools												
a. Systems flowcharting	17	58.6	9	31.0	3	10.3	0	0	0	0	0	0
b. Program flowcharting	21	72.4	7	24.1	1	3.4	0	0	0	0	0	0
c. Decision tables	6	20.7	5	17.2	15	51.7	3	10.3	0	0	0	0
d. Program debugging techniques	20	69.0	8	27.6	0	0	1	3.4	0	0	0	0
e. Program documentation	19	65.5	8	27.6	1	3.4	1	3.4	0	0	0	0
6. Computer Programming												
a. Use of machine-oriented language	12	41.4	5	17.2	7	24.1	5	17.2	0	0	0	0
b. Use of higher-level language	21	72.4	6	20.7	1	3.4	1	3.4	0	0	0	0
7. Computer Console Operation	7	24.1	11	37.9	8	27.6	2	6.9	0	0	1	3.4

Data Processing Content
Importance of This Topic In My Class(es)

Content	Wisconsin Post Secondary (N = 29)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	15	51.7	9	31.0	4	13.8	1	3.4	0	0	0	0
b. Types of primary storage	9	31.0	11	37.9	8	27.6	1	3.4	0	0	0	0
c. Computer number systems	11	37.9	11	37.9	6	20.7	1	3.4	0	0	0	0
d. Computer storage and addressing	17	58.6	8	27.6	3	10.3	1	3.4	0	0	0	0
e. Types of secondary storage	15	51.7	9	31.0	4	13.8	1	3.4	0	0	0	0
f. Input/output devices	17	58.6	9	31.0	2	6.9	1	3.4	0	0	0	0
9. Information Processing Concepts												
a. Batch processing	18	62.1	9	31.0	1	3.4	1	3.4	0	0	0	0
b. Random-access processing	16	55.2	10	34.5	2	6.9	1	3.4	0	0	0	0
c. Time sharing	12	41.4	7	24.1	8	27.6	1	3.4	1	3.4	0	0
d. Data communications	12	41.4	8	27.6	6	20.7	1	3.4	2	6.9	0	0
10. Systems Development and Design												
a. Basic systems design considerations	16	55.2	9	31.0	3	10.3	1	3.4	0	0	0	0
b. Forms design	13	44.8	6	20.7	8	27.6	2	6.9	0	0	0	0
c. Records management	9	31.0	6	20.7	8	27.6	4	13.8	2	6.9	0	0
d. Organizing and processing computer files	14	48.3	10	34.5	3	10.3	1	3.4	1	3.4	0	0
e. Data base concepts	12	41.4	6	20.7	8	27.6	2	6.9	1	3.4	0	0
f. Systems documentation	12	41.4	7	24.1	8	27.6	1	3.4	1	3.4	0	0
g. Internal systems controls	11	37.9	5	17.2	9	31.0	2	6.9	2	6.9	0	0
h. Evaluating and installing systems	9	31.0	4	13.8	10	34.5	5	17.2	1	3.4	0	0
11. Operating Systems Concepts												
a. Libraries	10	34.5	10	34.5	6	20.7	2	6.9	1	3.4	0	0
b. Utility programs	8	27.6	12	41.4	6	20.7	2	6.9	1	3.4	0	0
c. Supervisory programs	9	31.0	9	31.0	9	31.0	1	3.4	1	3.4	0	0
d. Compilers	9	31.0	12	41.4	7	24.1	1	3.4	0	0	0	0
e. Input/output control systems	9	31.0	9	31.0	8	27.6	2	6.9	1	3.4	0	0

Table 42

Data Processing Content
Importance of This Topic In My Class(es)

Content	Minnesota High School (N = 34)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	3	8.8	4	11.8	20	58.8	7	20.6	0	0	0	0
2. Social Impact of Computers	8	23.5	12	35.3	10	29.4	4	11.8	0	0	0	0
3. Computer Applications												
a. Business applications	12	35.3	16	47.1	5	14.7	1	2.9	0	0	0	0
b. Non-business applications	2	5.9	12	35.3	14	41.2	4	11.8	0	0	2	5.9
4. Unit Record Concepts												
a. Principles of unit record processing	13	38.2	15	44.1	3	8.8	2	5.9	0	0	1	2.9
b. Description of unit record machines	11	32.4	12	35.3	8	23.5	2	5.9	0	0	1	2.9
c. Operation of keypunch	18	52.9	11	32.4	4	11.8	1	2.9	0	0	0	0
d. Operation of several unit record machines	8	23.5	7	20.6	7	20.6	11	32.4	0	0	1	2.9
5. Problem-Solving Tools												
a. Systems flowcharting	4	11.8	15	44.1	9	26.5	6	17.6	0	0	0	0
b. Program flowcharting	7	20.6	12	35.3	11	32.4	4	11.8	0	0	0	0
c. Decision tables	2	5.9	5	14.7	13	38.2	7	20.6	6	17.6	1	2.9
d. Program debugging techniques	3	8.8	9	26.5	9	26.5	10	29.4	2	5.9	1	2.9
e. Program documentation	2	5.9	8	23.5	10	29.4	9	26.5	3	8.8	2	5.9
6. Computer Programming												
a. Use of machine-oriented language	4	11.8	10	29.4	9	26.5	10	29.4	1	2.9	0	0
b. Use of higher-level language	4	11.8	12	35.3	8	23.5	8	23.5	0	0	2	5.9
7. Computer Console Operation	3	8.8	3	8.8	12	35.3	10	29.4	3	8.8	3	8.8

Data Processing Content
Importance of This Topic In My Class(es)

Content	Minnesota High School (N = 34)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	8	23.5	10	29.4	8	23.5	7	20.6	1	2.9	0	0
b. Types of primary storage	8	23.5	11	32.4	6	17.6	8	23.5	1	2.9	0	0
c. Computer number systems	4	11.8	9	26.5	13	38.2	7	20.6	1	2.9	0	0
d. Computer storage and addressing	6	17.6	9	26.5	11	32.4	7	20.6	1	2.9	0	0
e. Types of secondary storage	5	14.7	10	29.4	10	29.4	8	23.5	1	2.9	0	0
f. Input/output devices	10	29.4	9	26.5	8	23.5	6	17.6	1	2.9	0	0
9. Information Processing Concepts												
a. Batch processing	0	0	8	23.5	10	29.4	9	26.5	5	14.7	2	5.9
b. Random-access processing	0	0	7	20.6	11	32.4	9	26.5	5	14.7	2	5.9
c. Time sharing	4	11.8	10	29.4	8	23.5	8	23.5	3	8.8	1	2.9
d. Data communications	1	2.9	8	23.5	9	26.5	9	26.5	5	14.7	2	5.9
10. Systems Development and Design												
a. Basic systems design considerations	1	2.9	1	2.9	11	32.4	14	41.2	5	14.7	2	5.9
b. Forms design	0	0	3	8.8	9	26.5	14	41.2	5	14.7	3	8.8
c. Records management	1	2.9	2	5.9	13	38.2	13	38.2	3	8.8	2	5.9
d. Organizing and processing computer files	1	2.9	2	5.9	9	26.5	14	41.2	6	17.6	2	5.9
e. Data base concepts	1	2.9	3	8.8	7	20.6	15	44.1	6	17.6	2	5.9
f. Systems documentation	0	0	1	2.9	7	20.6	18	52.9	6	17.6	2	5.9
g. Internal systems controls	0	0	0	0	9	26.5	18	52.9	5	14.7	2	5.9
h. Evaluating and installing systems	0	0	1	2.9	6	17.6	19	55.8	6	17.6	2	5.9
11. Operating Systems Concepts												
a. Libraries	0	0	4	11.8	6	17.6	15	44.1	7	20.6	2	5.9
b. Utility programs	0	0	0	0	7	20.6	16	47.1	9	26.5	2	5.9
c. Supervisory programs	0	0	0	0	7	20.6	15	44.1	10	29.4	2	5.9
d. Compilers	0	0	6	17.6	9	26.5	12	35.3	5	14.7	2	5.9
e. Input/output control systems	0	0	3	8.8	8	23.5	14	41.2	7	20.6	2	5.9

Table 43

Data Processing Content
Importance of This Topic In My Class(es)

Content	Wisconsin High School (N = 63)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	8	12.7	6	9.5	41	65.1	7	11.1	0	0	1	1.6
2. Social Impact of Computers	13	20.6	26	41.3	23	36.5	0	0	0	0	1	1.6
3. Computer Applications												
a. Business applications	30	47.6	26	41.3	6	9.5	0	0	0	0	1	1.6
b. Non-business applications	10	15.9	22	34.9	21	33.3	5	7.9	1	1.6	4	6.3
4. Unit Record Concepts												
a. Principles of unit record processing	20	31.7	28	44.4	10	15.9	3	4.8	0	0	2	3.2
b. Description of unit record machines	12	19.0	26	41.3	21	33.3	3	4.8	0	0	1	1.6
c. Operation of keypunch	22	34.9	16	25.4	15	23.8	9	14.3	0	0	1	1.6
d. Operation of several unit record machines	13	20.6	15	23.8	18	28.6	14	22.2	1	1.6	2	3.2
5. Problem-Solving Tools												
a. Systems flowcharting	12	19.0	21	33.3	19	30.2	7	11.1	2	3.2	2	3.2
b. Program flowcharting	21	33.3	22	34.9	12	19.0	5	7.9	1	1.6	2	3.2
c. Decision tables	4	6.3	14	22.2	11	17.5	18	28.6	10	15.9	6	9.5
d. Program debugging techniques	11	17.5	16	25.4	11	17.5	15	23.8	5	7.9	5	7.9
e. Program documentation	6	9.5	16	25.4	12	19.0	16	25.4	8	12.7	5	7.9
6. Computer Programming												
a. Use of machine-oriented language	13	20.6	12	19.0	21	33.3	9	14.3	4	6.3	4	6.3
b. Use of higher-level language	17	27.0	8	12.7	16	25.4	12	19.0	5	7.9	5	7.9
7. Computer Console Operation	4	6.3	6	9.5	23	36.5	22	34.9	3	4.8	5	7.9

Data Processing Content
Importance of This Topic In My Class(es)

Content	Wisconsin High School (N = 63)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	17	27.0	15	23.8	16	25.4	8	12.7	2	3.2	5	7.9
b. Types of primary storage	13	20.6	17	27.0	20	31.7	6	9.5	2	3.2	5	7.9
c. Computer number systems	10	15.9	15	23.8	24	38.1	6	9.5	3	4.8	5	7.9
d. Computer storage and addressing	12	19.0	13	20.6	23	36.5	6	9.5	4	6.3	5	7.9
e. Types of secondary storage	9	14.3	17	27.0	21	33.3	8	12.7	3	4.8	5	7.9
f. Input/output devices	12	19.0	25	39.7	14	22.2	5	7.9	2	3.2	5	7.9
9. Information Processing Concepts												
a. Batch processing	6	9.5	8	12.7	22	34.9	17	27.0	5	7.9	5	7.9
b. Random-access processing	4	6.3	8	12.7	26	41.3	16	25.4	4	6.3	5	7.9
c. Time sharing	6	9.5	7	11.1	25	39.7	14	22.2	5	7.9	6	9.5
d. Data communications	4	6.3	9	14.3	24	38.1	16	25.4	4	6.3	6	9.5
10. Systems Development and Design												
a. Basic systems design considerations	2	3.2	2	3.2	14	22.2	27	42.9	11	17.5	7	11.1
b. Forms design	4	6.3	3	4.8	15	23.8	24	38.1	10	15.9	7	11.1
c. Records management	4	6.3	5	7.9	17	27.0	20	31.7	11	17.5	6	9.5
d. Organizing and processing computer files	3	4.8	1	1.6	18	28.6	22	34.9	12	19.0	7	11.1
e. Data base concepts	3	4.8	0	0	15	23.8	21	33.3	18	28.6	6	9.5
f. Systems documentation	2	3.2	0	0	15	23.8	23	36.5	16	25.4	7	11.1
g. Internal systems controls	2	3.2	0	0	13	20.6	26	41.3	15	23.8	7	11.1
h. Evaluating and installing systems	2	3.2	0	0	12	19.0	26	41.3	17	27.0	6	9.5
11. Operating Systems Concepts												
a. Libraries	1	1.6	3	4.8	13	20.6	27	42.9	13	20.6	6	9.5
b. Utility programs	1	1.6	3	4.8	10	15.9	27	42.9	16	25.4	6	9.5
c. Supervisory programs	1	1.6	3	4.8	10	15.9	25	39.7	18	28.6	6	9.5
d. Compilers	1	1.6	5	7.9	16	25.4	24	38.1	11	17.5	6	9.5
e. Input/output control systems	1	1.6	6	9.5	14	22.2	24	38.1	12	19.0	6	9.5

Table 44

Data Processing Content
Importance of This Topic In My Class(es)

Content	Minnesota Community College (N = 8)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Data Processing History	4	50.0	4	50.0	0	0	0	0	0	0	0	0
2. Social Impact of Computers	4	50.0	2	25.0	2	25.0	0	0	0	0	0	0
3. Computer Applications												
a. Business applications	7	87.5	0	0	1	12.5	0	0	0	0	0	0
b. Non-business applications	3	37.5	0	0	3	37.5	2	25.0	0	0	0	0
4. Unit Record Concepts												
a. Principles of unit record processing	1	12.5	3	37.5	3	37.5	1	12.5	0	0	0	0
b. Description of unit record machines	1	12.5	3	37.5	3	37.5	1	12.5	0	0	0	0
c. Operation of keypunch	2	25.0	2	25.0	4	50.0	0	0	0	0	0	0
d. Operation of several unit record machines	1	12.5	2	25.0	4	50.0	1	12.5	0	0	0	0
5. Problem-Solving Tools												
a. Systems flowcharting	2	25.0	1	12.5	3	37.5	0	0	2	25.0	0	0
b. Program flowcharting	3	37.5	2	25.0	3	37.5	0	0	0	0	0	0
c. Decision tables	2	25.0	0	0	3	37.5	0	0	3	37.5	0	0
d. Program debugging techniques	2	25.0	0	0	4	50.0	1	12.5	1	12.5	0	0
e. Program documentation	2	25.0	0	0	2	25.0	1	12.5	3	37.5	0	0
6. Computer Programming												
a. Use of machine-oriented language	2	25.0	0	0	2	25.0	1	12.5	3	37.5	0	0
b. Use of higher-level language	2	25.0	0	0	3	37.5	2	25.0	1	12.5	0	0
7. Computer Console Operation	0	0	1	12.0	2	25.0	4	50.0	1	12.5	0	0

Data Processing Content
Importance of This Topic In My Class(es)

Content	Minnesota Community College (N = 8)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
8. Basic Computer Concepts												
a. Components of computer	2	25.0	0	0	3	37.5	0	0	2	25.0	0	0
b. Types of primary storage	2	25.0	0	0	3	37.5	0	0	2	25.0	1	12.5
c. Computer number systems	2	25.0	0	0	3	37.5	0	0	2	25.0	1	12.5
d. Computer storage and addressing	2	25.0	0	0	3	37.5	0	0	2	25.0	1	12.5
e. Types of secondary storage	2	25.0	0	0	3	37.5	0	0	2	25.0	1	12.5
f. Input/output devices	2	25.0	1	12.5	2	25.0	0	0	2	25.0	1	12.5
9. Information Processing Concepts												
a. Batch processing	2	25.0	0	0	2	25.0	2	25.0	1	12.5	1	12.5
b. Random-access processing	2	25.0	0	0	3	37.5	2	25.0	2	25.0	0	0
c. Time sharing	3	37.5	2	25.0	0	0	2	25.0	1	12.5	0	0
d. Data communications	1	12.5	2	25.0	2	25.0	1	12.5	2	25.0	0	0
10. Systems Development and Design												
a. Basic systems design considerations	2	25.0	1	12.5	1	12.5	2	25.0	2	25.0	2	25.0
b. Forms design	2	25.0	0	0	1	12.5	3	37.5	2	25.0	0	0
c. Records management	2	25.0	0	0	3	37.5	2	25.0	1	12.5	1	12.5
d. Organizing and processing computer files	2	25.0	1	12.5	1	12.5	2	25.0	2	25.0	0	0
e. Data base concepts	2	25.0	0	0	1	12.5	2	25.0	3	37.5	0	0
f. Systems documentation	2	25.0	0	0	1	12.5	2	25.0	3	37.5	0	0
g. Internal systems controls	2	25.0	0	0	1	12.5	2	25.0	3	37.5	0	0
h. Evaluating and installing systems	2	25.0	0	0	0	0	3	37.5	3	37.5	0	0
11. Operating Systems Concepts												
a. Libraries	1	12.5	2	25.0	1	12.5	2	25.0	2	25.0	0	0
b. Utility programs	1	12.5	2	25.0	0	0	2	25.0	3	37.5	0	0
c. Supervisory programs	1	12.5	1	12.5	1	12.5	2	25.0	3	37.5	0	0
d. Compilers	1	12.5	1	12.5	1	12.5	2	25.0	3	37.5	0	0
e. Input/output control systems	1	12.5	1	12.5	1	12.5	3	37.5	2	25.0	0	0

Appendix G

Table 45

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	8	42.1	10	52.6	1	5.3	7	24.1	21	72.4	1	3.4
b. Articulating data processing instruction with other educational institutions	4	21.1	14	73.7	1	5.3	7	24.1	20	69.0	2	6.9
c. Organizing time so as to be well prepared for classroom instruction	9	47.4	9	47.4	1	5.3	16	55.2	12	41.4	1	3.4
d. Determining the appropriate pace at which to present materials	9	47.4	9	47.4	1	5.3	14	48.3	14	48.3	1	3.4
e. Determining the appropriate length of time to spend on any one subject	6	31.6	12	63.2	1	5.3	12	41.4	15	51.7	2	6.9
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	9	47.4	9	47.4	1	5.3	15	51.7	13	44.8	1	3.4
b. Relating the research to curriculum decisions	3	15.8	14	73.7	2	10.5	9	31.0	18	62.1	2	6.9
c. Developing unit instructional plans	12	63.2	6	31.6	1	5.3	14	48.3	13	44.8	2	6.9
d. Developing daily lesson plans	10	52.6	8	42.1	1	5.3	15	51.7	13	44.8	1	3.4
e. Developing audio-visual materials	9	47.4	9	47.4	1	5.3	18	62.1	10	34.5	1	3.4
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	8	42.1	10	52.6	1	5.3	14	48.3	14	48.3	1	3.4
g. Making data processing practical rather than theoretical for students	8	42.1	10	52.6	1	5.3	8	27.6	20	69.0	1	3.4
h. Integrating theoretical considerations with practical applications	5	26.3	13	68.4	1	5.3	8	27.6	20	69.0	1	3.4

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	4	21.1	14	73.7	1	5.3	10	34.5	18	62.1	1	3.4
b. Helping students who have reading problems	2	10.5	16	84.2	1	5.3	3	10.3	24	82.8	2	6.9
c. Providing students with the opportunity for supplemental learning	7	36.8	11	57.9	1	5.3	11	37.9	16	55.2	2	6.9
d. Eliminating distracting mannerisms from classroom presentations	6	31.6	12	63.2	1	5.3	12	41.4	14	48.3	3	10.3
e. Determining the time and variety of activities so as to keep the class interesting	8	42.1	10	52.6	1	5.3	11	37.9	16	55.2	2	6.9
f. Utilizing guest speakers effectively	5	26.3	13	68.4	1	5.3	9	31.0	18	62.1	2	6.9
g. Individualizing instruction for the needs of specific students	6	31.6	12	63.2	1	5.3	12	41.4	14	48.3	3	10.3
4. Student Evaluation												
a. Preassessing student competencies	7	36.8	10	52.6	2	10.5	13	44.8	15	51.7	1	3.4
b. Developing tests for achievement evaluation	10	52.6	8	42.1	1	5.3	14	48.3	14	48.3	1	3.4
c. Determining appropriate standards to be used in the classroom	11	57.9	7	36.8	1	5.3	11	37.9	17	58.6	1	3.4
5. Facilities												
a. Utilizing the library in instruction	7	36.8	10	52.6	2	10.5	14	48.3	14	48.3	1	3.4
b. Utilizing field trips effectively	7	36.8	11	57.9	1	5.3	9	31.0	19	65.5	1	3.4
c. Planning for the acquisition of equipment in data processing	7	36.8	11	57.9	1	5.3	7	24.1	21	72.4	1	3.4
d. Teaching data processing concepts with limited or no equipment	7	36.8	11	57.9	1	5.3	7	24.1	20	69.0	2	6.9

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	8	42.1	10	52.6	1	5.3	13	44.8	15	51.7	1	3.4
b. Being fair and objective in class	10	52.6	8	42.1	1	5.3	14	48.3	12	41.4	3	10.3
c. Developing good interpersonal relationships	11	57.9	7	36.8	1	5.3	15	51.7	11	37.9	3	10.3
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	13	68.4	5	26.3	1	5.3	18	62.1	8	27.6	3	10.3
b. Developing professionalism as related to professional organizations and literature	11	57.9	7	36.8	1	5.3	13	44.8	13	44.8	3	10.3
c. Determining ways of keeping current within the area of data processing	9	47.4	9	47.4	1	5.3	9	31.0	16	55.2	4	13.8

Table 46

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of business in the offering of data processing instruction	9	26.5	24	70.6	1	2.9	11	17.5	47	74.6	5	7.9
b. Articulating data processing instruction with other educational institutions	3	8.8	29	85.3	2	5.9	8	12.7	50	79.4	5	7.9
c. Organizing time so as to be well prepared for classroom instruction	17	50.0	16	47.1	1	2.9	26	41.3	32	50.8	5	7.9
d. Determining the appropriate pace at which to present materials	11	32.4	22	64.7	1	2.9	18	28.6	40	63.5	5	7.9
e. Determining the appropriate length of time to spend on any one subject	11	32.4	21	61.8	2	5.9	16	25.4	42	66.7	5	7.9
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	12	35.3	20	58.8	2	5.9	20	31.7	39	61.9	4	6.3
b. Relating the research to curriculum decisions	8	23.5	23	67.6	3	8.8	15	23.8	44	69.8	4	6.3
c. Developing unit instructional plans	18	52.9	15	44.1	1	2.9	26	41.3	32	50.8	5	7.9
d. Developing daily lesson plans	20	58.8	13	38.2	1	2.9	31	49.2	28	44.4	4	6.3
e. Developing audio-visual materials	18	52.9	15	44.1	1	2.9	23	36.5	36	57.1	4	6.3
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	10	29.4	23	67.6	1	2.9	24	38.1	35	55.6	4	6.3
g. Making data processing practical rather than theoretical for students	11	32.4	21	61.8	2	5.9	19	30.2	40	63.5	4	6.3
h. Integrating theoretical considerations with practical applications	10	29.4	22	64.7	2	5.9	15	23.8	44	69.8	4	6.3

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	9	26.5	22	64.7	3	8.8	13	20.6	45	71.4	5	7.9
b. Helping students who have reading problems	8	23.5	25	73.5	1	2.9	11	17.5	47	74.6	5	7.9
c. Providing students with the opportunity for supplemental learning	14	41.2	19	55.9	1	2.9	24	38.1	34	54.0	5	7.9
d. Eliminating distracting mannerisms from classroom presentations	14	41.2	19	55.9	1	2.9	27	42.9	31	49.2	5	7.9
e. Determining the time and variety of activities so as to keep the class interesting	14	41.2	18	52.9	2	5.9	29	46.0	29	46.0	5	7.9
f. Utilizing guest speakers effectively	12	35.3	21	61.8	1	2.9	24	38.1	34	54.0	5	7.9
g. Individualizing instruction for the needs of specific students	17	50.0	15	44.1	2	5.9	25	39.7	32	50.8	6	9.5
4. Student Evaluation												
a. Preassessing student competencies	11	32.4	21	61.8	2	5.9	23	36.5	34	54.0	6	9.5
b. Developing tests for achievement evaluation	15	44.1	18	52.9	1	2.9	32	50.8	26	41.3	5	7.9
c. Determining appropriate standards to be used in the classroom	13	38.2	20	58.8	1	2.9	21	33.3	37	58.7	5	7.9
5. Facilities												
a. Utilizing the library in instruction	14	41.2	19	55.9	1	2.9	19	30.2	39	61.9	5	7.9
b. Utilizing field trips effectively	17	50.0	16	47.1	1	2.9	23	36.5	35	55.6	5	7.9
c. Planning for the acquisition of equipment in data processing	10	29.4	21	61.8	3	8.8	15	23.8	43	68.3	5	7.9
d. Teaching data processing concepts with limited or no equipment	16	47.1	17	50.0	1	2.9	25	39.7	33	52.4	5	7.9

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	16	47.1	17	50.0	1	2.9	27	42.9	31	49.2	5	7.9
b. Being fair and objective in class	21	61.8	12	35.3	1	2.9	33	52.4	25	39.7	5	7.9
c. Developing good interpersonal relationships	22	64.7	11	32.4	1	2.9	33	52.4	25	39.7	5	7.9
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	25	73.5	8	23.5	1	2.9	37	58.7	21	33.3	5	7.9
b. Developing professionalism as related to professional organizations and literature	24	70.6	9	26.5	1	2.9	31	49.2	27	42.9	5	7.9
c. Determining ways of keeping current within the area of data processing	17	50.0	15	44.1	2	5.9	27	42.9	31	49.2	5	7.9

Table 47

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
1. Planning						
a. Cooperating with departments outside of Business in the offering of data processing instruction	4	50.0	4	50.0	0	0
b. Articulating data processing instruction with other educational institutions	3	37.5	5	62.5	0	0
c. Organizing time so as to be well prepared for classroom instruction	5	62.5	3	37.5	0	0
d. Determining the appropriate pace at which to present materials	6	75.0	2	25.0	0	0
e. Determining the appropriate length of time to spend on any one subject	4	50.0	3	37.5	1	12.5
2. Curriculum Development						
a. Developing behavioral objectives for a data-processing course	5	62.5	3	37.5	0	0
b. Relating the research to curriculum decisions	3	37.5	5	62.5	0	0
c. Developing unit instructional plans	4	50.0	4	50.0	0	0
d. Developing daily lesson plans	5	62.5	3	37.5	0	0
e. Developing audio-visual materials	6	75.0	2	25.0	0	0
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	4	50.0	4	50.0	0	0
g. Making data processing practical rather than theoretical for students	3	37.5	5	62.5	0	0
h. Integrating theoretical considerations with practical applications	2	25.0	6	75.0	0	0

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
3. Methodologies						
a. Relating research to classroom activities	4	50.0	4	50.0	0	0
b. Helping students who have reading problems	3	37.5	5	62.5	0	0
c. Providing students with the opportunity for supplemental learning	5	62.5	3	37.5	0	0
d. Eliminating distracting mannerisms from classroom presentations	7	87.5	1	12.5	0	0
e. Determining the time and variety of activities so as to keep the class interesting	5	62.5	3	37.5	0	0
f. Utilizing guest speakers effectively	4	50.0	4	50.0	0	0
g. Individualizing instruction for the needs of specific students	6	75.0	2	25.0	0	0
4. Student Evaluation						
a. Preassessing student competencies	4	50.0	4	50.0	0	0
b. Developing tests for achievement evaluation	6	75.0	2	25.0	0	0
c. Determining appropriate standards to be used in the classroom	6	75.0	2	25.0	0	0
5. Facilities						
a. Utilizing the library in instruction	4	50.0	4	50.0	0	0
b. Utilizing field trips effectively	4	50.0	4	50.0	0	0
c. Planning for the acquisition of equipment in data processing	5	62.5	3	37.5	0	0
d. Teaching data processing concepts with limited or no equipment	6	75.0	2	25.0	0	0

Data Processing Teaching Competencies
Had Instruction In This Competency?

Competency	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
6. Human Relations						
a. Providing guidance to students as related to personal problems	6	75.0	2	25.0	0	0
b. Being fair and objective in class	6	75.0	2	25.0	0	0
c. Developing good interpersonal relationships	6	75.0	2	25.0	0	0
7. Other						
a. Developing a philosophy regarding the role of the teacher in the classroom	6	75.0	2	25.0	0	0
b. Developing professionalism as related to professional organizations and literature	5	62.5	3	37.5	0	0
c. Determining ways of keeping current within the area of data processing	5	62.5	3	37.5	0	0

Appendix H

Table 48

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	9	47.4	6	31.6	4	21.1	14	48.3	9	31.0	6	20.7
b. Articulating data processing instruction with other educational institutions	10	52.6	6	31.6	3	15.8	13	44.8	11	37.9	5	17.2
c. Organizing time so as to be well prepared for classroom instruction	5	26.3	11	57.9	3	15.8	9	31.0	14	48.3	6	20.7
d. Determining the appropriate pace at which to present materials	8	42.1	8	42.1	3	15.8	10	34.5	13	44.8	6	20.7
e. Determining the appropriate length of time to spend on any one subject	8	42.1	7	36.8	4	21.1	10	34.5	14	48.3	5	17.2
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	9	47.4	7	36.8	3	15.8	9	31.0	14	48.3	6	20.7
b. Relating the research to curriculum decisions	9	47.4	5	26.3	5	26.3	13	44.8	12	41.4	4	13.8
c. Developing unit instructional plans	7	36.8	8	42.1	4	21.1	11	37.9	12	41.4	6	20.7
d. Developing daily lesson plans	6	31.6	10	52.6	3	15.8	6	20.7	16	55.2	7	24.1
e. Developing audio-visual materials	10	52.6	5	26.3	4	21.1	13	44.8	10	34.5	6	20.7
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	9	47.4	7	36.8	3	15.8	13	44.8	11	37.9	5	17.2
g. Making data processing practical rather than theoretical for students	9	47.4	7	36.8	3	15.8	13	44.8	11	37.9	5	17.2
h. Integrating theoretical considerations with practical applications	8	42.1	9	47.4	2	10.5	13	44.8	11	37.9	5	17.2

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	4	21.1	13	68.4	2	10.5	11	37.9	13	44.8	5	17.2
b. Helping students who have reading problems	7	36.8	10	52.6	2	10.5	9	31.0	17	58.6	3	10.3
c. Providing students with the opportunity for supplemental learning	7	36.8	10	52.6	2	10.5	5	17.2	17	58.6	7	24.1
d. Eliminating distracting mannerisms from classroom presentations	6	31.6	11	57.9	2	10.5	12	41.4	11	37.9	6	20.7
e. Determining the time and variety of activities so as to keep the class interesting	6	31.6	11	57.9	2	10.5	13	44.8	9	31.0	7	24.1
f. Utilizing guest speakers effectively	9	47.4	8	42.1	2	10.5	11	37.9	10	34.5	8	27.6
g. Individualizing instruction for the needs of specific students	11	57.9	6	31.6	2	10.5	17	58.6	5	17.2	7	24.1
4. Student Evaluation												
a. Preassessing student competencies	7	36.8	9	47.4	3	15.8	12	41.4	11	37.9	6	20.7
b. Developing tests for achievement evaluation	9	47.4	8	42.1	2	10.5	15	51.7	8	27.6	6	20.7
c. Determining appropriate standards to be used in the classroom	8	42.1	9	47.4	2	10.5	13	44.8	10	34.5	6	20.7
5. Facilities												
a. Utilizing the library in instruction	5	26.3	11	57.9	3	15.8	8	27.6	15	51.7	6	20.7
b. Utilizing field trips effectively	7	36.8	10	52.6	2	10.5	8	27.6	15	51.7	6	20.7
c. Planning for the acquisition of equipment in data processing	10	52.6	7	36.8	2	10.5	12	41.4	13	44.8	4	13.8
d. Teaching data processing concepts with limited or no equipment	4	21.1	13	68.4	2	10.5	4	13.8	20	69.0	5	17.2

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota AVTI (N=19)						Wisconsin Post Secondary (N=29)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	10	52.6	7	36.8	2	10.5	11	37.9	14	48.3	4	13.8
b. Being fair and objective in class	5	26.3	12	63.2	2	10.5	7	24.1	14	48.3	8	27.6
c. Developing good interpersonal relationships	6	31.6	10	52.6	3	15.8	10	34.5	12	41.4	7	24.1
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	2	10.5	14	73.7	3	15.8	8	27.6	13	44.8	8	27.6
b. Developing professionalism as related to professional organizations and literature	4	21.1	13	68.4	4	21.1	9	31.0	13	44.8	7	24.1
c. Determining ways of keeping current within the area of data processing	11	57.9	6	31.6	2	10.5	13	44.8	10	34.5	6	20.7

Table 49

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	21	61.8	10	29.4	3	8.8	37	58.7	17	27.0	9	14.3
b. Articulating data processing instruction with other educational institutions	20	58.8	13	38.2	1	2.9	43	68.3	11	17.5	9	14.3
c. Organizing time so as to be well prepared for classroom instruction	12	38.7	19	61.3	3	8.8	35	55.6	19	30.2	9	14.3
d. Determining the appropriate pace at which to present materials	20	58.8	12	35.3	2	5.9	40	63.5	15	23.8	8	12.7
e. Determining the appropriate length of time to spend on any one subject	22	64.7	11	32.4	1	2.9	39	61.9	16	25.4	8	12.7
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	18	52.9	14	41.2	2	5.9	38	60.3	17	27.0	8	12.7
b. Relating the research to curriculum decisions	17	50.0	14	41.2	3	8.8	34	54.0	20	31.7	9	14.3
c. Developing unit instructional plans	15	44.1	16	47.1	3	8.8	36	57.1	18	28.6	9	14.3
d. Developing daily lesson plans	15	44.1	16	47.1	3	8.8	30	47.6	24	38.1	9	14.3
e. Developing audio-visual materials	19	55.9	12	35.3	3	8.8	38	60.3	16	25.4	9	14.3
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	18	52.9	13	38.2	3	8.8	38	60.3	17	27.0	8	12.7
g. Making data processing practical rather than theoretical for students	24	70.6	8	23.5	2	5.9	44	69.8	11	17.5	8	12.7
h. Integrating theoretical considerations with practical applications	21	61.8	10	29.4	3	8.8	43	68.3	11	17.5	9	14.3

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	15	44.1	16	47.1	3	8.8	30	47.6	24	38.1	9	14.3
b. Helping students who have reading problems	12	35.3	18	52.9	4	11.8	34	54.0	18	28.6	11	17.5
c. Providing students with the opportunity for supplemental learning	14	41.2	16	47.1	4	11.8	34	54.0	20	31.7	9	14.3
d. Eliminating distracting mannerisms from classroom presentations	11	32.4	17	50.0	6	17.6	22	34.9	32	50.8	9	14.3
e. Determining the time and variety of activities so as to keep the class interesting	15	44.1	14	41.2	5	14.7	34	54.0	20	31.7	9	14.3
f. Utilizing guest speakers effectively	15	44.1	14	41.2	5	14.7	28	44.4	26	41.3	9	14.3
g. Individualizing instruction for the needs of specific students	18	52.9	11	32.4	5	14.7	37	58.7	17	27.0	9	14.3
4. Student Evaluation												
a. Preassessing student competencies	14	41.2	14	41.2	6	17.6	32	50.8	21	33.3	10	15.9
b. Developing tests for achievement evaluation	16	47.1	14	41.2	4	11.8	34	54.0	20	31.7	9	14.3
c. Determining appropriate standards to be used in the classroom	18	52.9	12	35.3	4	11.8	37	58.7	17	27.0	9	14.3
5. Facilities												
a. Utilizing the library in instruction	11	32.4	16	47.1	7	20.6	29	46.0	24	38.1	10	15.9
b. Utilizing field trips effectively	12	35.3	15	44.1	7	20.6	34	54.0	19	30.2	10	15.9
c. Planning for the acquisition of equipment in data processing	18	52.9	11	32.4	5	14.7	40	63.5	13	20.6	10	15.9
d. Teaching data processing concepts with limited or no equipment	14	41.2	13	38.2	7	20.6	38	60.3	15	23.8	10	15.9

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota High School (N=34)						Wisconsin High School (N=63)					
	Yes		No		No Response		Yes		No		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	11	32.4	17	50.0	6	17.6	27	42.9	26	41.3	10	15.9
b. Being fair and objective in class	10	29.4	18	52.9	6	17.6	22	34.9	31	49.2	10	15.9
c. Developing good interpersonal relationships	9	26.5	19	55.9	6	17.6	21	33.3	32	50.8	10	15.9
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	9	26.5	18	52.9	7	20.6	20	31.7	34	54.0	9	14.3
b. Developing professionalism as related to professional organizations and literature	7	20.6	20	58.8	7	20.6	22	34.9	32	50.8	9	14.3
c. Determining ways of keeping current within the area of data processing	13	38.2	15	44.1	6	17.6	38	60.3	16	25.4	9	14.3

Table 50

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
1. Planning						
a. Cooperating with departments outside of Business in the offering of data processing instruction	2	25.0	4	50.0	2	25.0
b. Articulating data processing instruction with other educational institutions	3	37.5	4	50.0	1	12.5
c. Organizing time so as to be well prepared for classroom instruction	2	25.0	4	50.0	2	25.0
d. Determining the appropriate pace at which to present materials	2	25.0	4	50.0	2	25.0
e. Determining the appropriate length of time to spend on any one subject	2	25.0	4	50.0	2	25.0
2. Curriculum Development						
a. Developing behavioral objectives for a data-processing course	3	37.5	4	50.0	1	12.5
b. Relating the research to curriculum decisions	2	25.0	5	62.5	1	12.5
c. Developing unit instructional plans	2	25.0	5	62.5	1	12.5
d. Developing daily lesson plans	2	25.0	5	62.5	1	12.5
e. Developing audio-visual materials	3	37.5	4	50.0	1	12.5
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	2	25.0	5	62.5	1	12.5
g. Making data processing practical rather than theoretical for students	4	50.0	3	37.5	1	12.5
h. Integrating theoretical considerations with practical applications	4	50.0	3	37.5	1	12.5

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
3. Methodologies						
a. Relating research to classroom activities	3	37.5	4	50.0	1	12.5
b. Helping students who have reading problems	2	25.0	6	75.0	0	0
c. Providing students with the opportunity for supplemental learning	2	25.0	5	62.5	1	12.5
d. Eliminating distracting mannerisms from classroom presentations	1	12.5	6	75.0	1	12.5
e. Determining the time and variety of activities so as to keep the class interesting	2	25.0	5	62.5	1	12.5
f. Utilizing guest speakers effectively	3	37.5	4	50.0	1	12.5
g. Individualizing instruction for the needs of specific students	3	37.5	4	50.0	1	12.5
4. Student Evaluation						
a. Preassessing student competencies	4	50.0	3	37.5	1	12.5
b. Developing tests for achievement evaluation	4	50.0	3	37.5	1	12.5
c. Determining appropriate standards to be used in the classroom	4	50.0	3	37.5	1	12.5
5. Facilities						
a. Utilizing the library in instruction	0	0	7	87.5	1	12.5
b. Utilizing field trips effectively	3	37.5	4	50.0	1	12.5
c. Planning for the acquisition of equipment in data processing	1	12.5	6	75.0	1	12.5
d. Teaching data processing concepts with limited or no equipment	2	25.0	6	75.0	0	0

Data Processing Teaching Competencies
Need Instruction In This Competency?

Competency	Minnesota Community College (N = 8)					
	Yes		No		No Response	
	n	%	n	%	n	%
6. Human Relations						
a. Providing guidance to students as related to personal problems	2	25.0	5	62.5	1	12.5
b. Being fair and objective in class	1	12.5	6	75.0	1	12.5
c. Developing good interpersonal relationships	1	12.5	6	75.0	1	12.5
7. Other						
a. Developing a philosophy regarding the role of the teacher in the classroom	2	25.0	5	62.5	1	12.5
b. Developing professionalism as related to professional organizations and literature	3	37.5	4	50.0	1	12.5
c. Determining ways of keeping current within the area of data processing	5	62.5	2	25.0	1	12.5

Appendix I

Table 51

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota AVTI (N = 19)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	2	10.5	12	63.2	4	21.1	0	0	0	0	1	5.3
b. Articulating data processing instruction with other educational institutions	1	5.3	5	26.3	10	52.6	1	5.3	1	5.3	1	5.3
c. Organizing time so as to be well prepared for classroom instruction	6	31.6	8	42.1	2	10.5	2	10.5	0	0	1	5.3
d. Determining the appropriate pace at which to present materials	5	26.3	9	47.4	2	10.5	2	10.5	0	0	1	5.3
e. Determining the appropriate length of time to spend on any one subject	7	36.8	7	36.8	3	15.8	1	5.3	0	0	1	5.3
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	7	36.8	9	47.4	2	10.5	0	0	0	0	1	5.3
b. Relating the research to curriculum decisions	4	21.1	6	31.6	7	36.8	0	0	0	0	2	10.5
c. Developing unit instructional plans	7	36.8	9	47.4	2	10.5	0	0	0	0	1	5.3
d. Developing daily lesson plans	3	15.8	6	31.6	6	31.6	3	15.8	0	0	1	5.3
e. Developing audio-visual materials	5	26.3	7	36.8	6	31.6	0	0	0	0	1	5.3
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	6	31.6	8	42.1	4	21.1	0	0	0	0	1	5.3
g. Making data processing practical rather than theoretical for students	10	52.6	7	36.8	1	5.3	0	0	0	0	1	5.3
h. Integrating theoretical considerations with practical applications	3	15.8	11	57.9	2	10.5	2	10.5	0	0	1	5.3

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota AVTI (N = 19)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	0	0	7	36.8	7	36.8	4	21.1	0	0	1	5.3
b. Helping students who have reading problems	1	5.3	8	42.1	6	31.6	2	10.5	1	5.3	1	5.3
c. Providing students with the opportunity for supplemental learning	1	5.3	11	57.9	5	26.3	1	5.3	0	0	1	5.3
d. Eliminating distracting mannerisms from classroom presentations	1	5.3	8	42.1	8	42.1	1	5.3	0	0	1	5.3
e. Determining the time and variety of activities so as to keep the class interesting	6	31.6	8	42.1	3	15.8	1	5.3	0	0	1	5.3
f. Utilizing guest speakers effectively	1	5.3	6	31.6	11	57.9	0	0	0	0	1	5.3
g. Individualizing instruction for the needs of specific students	6	31.6	9	47.4	2	10.5	1	5.3	0	0	1	5.3
4. Student Evaluation												
a. Preassessing student competencies	4	21.1	6	31.6	6	31.6	1	5.3	1	5.3	1	5.3
b. Developing tests for achievement evaluation	3	15.8	13	68.4	2	10.5	0	0	0	0	1	5.3
c. Determining appropriate standards to be used in the classroom	2	10.5	12	63.2	3	15.8	0	0	1	5.3	1	5.3
5. Facilities												
a. Utilizing the library in instruction	0	0	4	21.1	13	68.4	0	0	1	5.3	1	5.3
b. Utilizing field trips effectively	1	5.3	4	21.1	12	63.2	1	5.3	0	0	1	5.3
c. Planning for the acquisition of equipment in data processing	4	21.1	6	31.6	8	42.1	0	0	0	0	1	5.3
d. Teaching data processing concepts with limited or no equipment	0	0	4	21.1	9	47.4	3	15.8	2	10.5	1	5.3

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota AVTI (N = 19)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	4	21.1	9	47.4	5	26.3	0	0	0	0	1	5.3
b. Being fair and objective in class	8	42.1	8	42.1	2	10.5	0	0	0	0	1	5.3
c. Developing good interpersonal relationships	5	26.3	11	57.9	2	10.5	0	0	0	0	1	5.3
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	6	31.6	7	36.8	4	21.1	1	5.3	0	0	1	5.3
b. Developing professionalism as related to professional organizations and literature	5	26.3	7	36.8	5	26.3	0	0	1	5.3	1	5.3
c. Determining ways of keeping current within the area of data processing	10	52.6	8	42.1	0	0	0	0	0	0	1	5.3

Table 52

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Wisconsin Post Secondary (N = 29)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	6	20.7	6	20.7	10	34.5	5	17.2	1	3.4	1	3.4
b. Articulating data processing instruction with other educational institutions	6	20.7	6	20.7	9	31.0	4	13.8	2	6.9	2	6.9
c. Organizing time so as to be well prepared for classroom instruction	11	37.9	10	34.5	2	6.9	5	17.2	0	0	1	3.4
d. Determining the appropriate pace at which to present materials	10	34.5	11	37.9	3	10.3	4	13.8	0	0	1	3.4
e. Determining the appropriate length of time to spend on any one subject	9	31.0	8	27.6	6	20.7	5	17.2	0	0	1	3.4
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	7	24.1	9	31.0	5	17.2	6	20.7	1	3.4	1	3.4
b. Relating the research to curriculum decisions	5	17.2	6	20.7	8	27.6	6	20.7	3	10.3	1	3.4
c. Developing unit instructional plans	5	17.2	11	37.9	6	20.7	5	17.2	1	3.4	1	3.4
d. Developing daily lesson plans	5	17.2	8	27.6	7	24.1	7	24.1	1	3.4	1	3.4
e. Developing audio-visual materials	6	20.7	10	34.5	8	27.6	3	10.3	1	3.4	1	3.4
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	8	27.6	5	17.2	11	37.9	3	10.3	1	3.4	1	3.4
g. Making data processing practical rather than theoretical for students	18	62.1	5	17.2	1	3.4	3	10.3	1	3.4	1	3.4
h. Integrating theoretical considerations with practical applications	12	41.4	6	20.7	7	24.1	2	6.9	1	3.4	1	3.4

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Wisconsin Post Secondary (N = 29)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	4	13.8	6	20.7	11	37.9	5	17.2	2	6.9	1	3.4
b. Helping students who have reading problems	6	20.7	4	13.8	7	24.1	10	34.5	1	3.4	1	3.4
c. Providing students with the opportunity for supplemental learning	4	13.8	10	34.5	10	34.5	4	13.8	0	0	1	3.4
d. Eliminating distracting mannerisms from classroom presentations	5	17.2	7	24.1	12	41.4	4	13.8	0	0	1	3.4
e. Determining the time and variety of activities so as to keep the class interesting	10	34.5	7	24.1	9	31.0	2	6.9	0	0	1	3.4
f. Utilizing guest speakers effectively	5	17.2	6	20.7	8	27.6	9	31.0	0	0	1	3.4
g. Individualizing instruction for the needs of specific students	6	20.7	8	27.6	10	34.5	4	13.8	0	0	1	3.4
4. Student Evaluation												
a. Preassessing student competencies	5	17.2	10	34.5	7	24.1	5	17.2	0	0	2	6.9
b. Developing tests for achievement evaluation	8	27.6	13	44.8	2	6.9	3	10.3	1	3.4	2	6.9
c. Determining appropriate standards to be used in the classroom	6	20.7	11	37.9	5	17.2	3	10.3	2	6.9	2	6.9
5. Facilities												
a. Utilizing the library in instruction	3	10.3	6	20.7	14	48.3	4	13.8	0	0	2	6.9
b. Utilizing field trips effectively	5	17.2	6	20.7	10	34.5	6	20.7	0	0	2	6.9
c. Planning for the acquisition of equipment in data processing	8	27.6	9	31.0	5	17.2	5	17.2	0	0	2	6.9
d. Teaching data processing concepts with limited or no equipment	3	10.3	5	17.2	6	20.7	13	44.8	1	3.4	1	3.4

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Wisconsin Post Secondary (N = 29)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	4	13.8	6	20.7	10	34.5	7	24.1	1	3.4	1	3.4
b. Being fair and objective in class	15	51.7	8	27.6	3	10.3	2	6.9	0	0	1	3.4
c. Developing good interpersonal relationships	10	34.5	9	31.0	7	24.1	2	6.9	0	0	1	3.4
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	8	27.6	9	31.0	6	20.7	4	13.8	0	0	2	6.9
b. Developing professionalism as related to professional organizations and literature	8	27.6	8	27.6	8	27.6	3	10.3	0	0	2	6.9
c. Determining ways of keeping current within the area of data processing	17	58.6	6	20.7	1	3.4	2	6.9	0	0	3	10.3

Table 53

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota High School (N = 34)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	8	23.5	7	20.6	11	32.4	6	17.6	1	2.9	1	2.9
b. Articulating data processing instruction with other educational institutions	3	8.8	6	17.6	15	44.1	9	26.5	0	0	1	2.9
c. Organizing time so as to be well prepared for classroom instruction	13	38.2	11	32.4	4	11.8	4	11.8	0	0	2	5.9
d. Determining the appropriate pace at which to present materials	14	41.2	10	29.4	4	11.8	4	11.8	0	0	2	5.9
e. Determining the appropriate length of time to spend on any one subject	13	38.2	13	38.2	4	11.8	2	5.9	0	0	2	5.9
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	11	32.4	12	35.3	5	14.7	6	17.6	0	0	0	0
b. Relating the research to curriculum decisions	7	20.6	12	35.3	7	20.6	7	20.6	1	2.9	0	0
c. Developing unit instructional plans	8	23.5	17	50.0	4	11.8	5	14.7	0	0	0	0
d. Developing daily lesson plans	9	26.5	14	41.2	5	14.7	5	14.7	0	0	1	2.9
e. Developing audio-visual materials	9	26.5	12	35.3	8	23.5	5	14.7	0	0	0	0
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	10	29.4	14	41.2	7	20.6	3	8.8	0	0	0	0
g. Making data processing practical rather than theoretical for students	17	50.0	12	35.3	3	8.8	2	5.9	0	0	0	0
h. Integrating theoretical considerations with practical applications	7	20.6	14	41.2	9	26.5	4	11.8	0	0	0	0

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota High School (N = 34)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	6	17.6	13	38.2	8	23.5	5	14.7	0	0	2	5.9
b. Helping students who have reading problems	5	14.7	12	35.3	8	23.5	7	20.6	0	0	2	5.9
c. Providing students with the opportunity for supplemental learning	7	20.6	16	47.1	7	20.6	2	5.9	0	0	2	5.9
d. Eliminating distracting mannerisms from classroom presentations	5	14.7	14	41.2	9	26.5	3	8.8	0	0	3	8.8
e. Determining the time and variety of activities so as to keep the class interesting	11	32.4	14	41.2	5	14.7	2	5.9	0	0	2	5.9
f. Utilizing guest speakers effectively	7	20.6	13	38.2	10	29.4	2	5.9	0	0	2	5.9
g. Individualizing instruction for the needs of specific students	10	29.4	15	44.1	4	11.8	2	5.9	0	0	3	8.8
4. Student Evaluation												
a. Preassessing student competencies	15	14.7	13	38.2	7	20.6	4	11.8	2	5.9	3	8.8
b. Developing tests for achievement evaluation	7	20.6	12	35.3	8	23.5	4	11.8	0	0	3	8.8
c. Determining appropriate standards to be used in the classroom	6	17.6	16	47.1	5	14.7	4	11.8	0	0	3	8.8
5. Facilities												
a. Utilizing the library in instruction	8	23.5	5	14.7	11	32.4	8	23.5	0	0	2	5.9
b. Utilizing field trips effectively	10	29.4	12	35.3	8	23.5	2	5.9	0	0	2	5.9
c. Planning for the acquisition of equipment in data processing	7	20.6	11	32.4	9	26.5	5	14.7	0	0	2	5.9
d. Teaching data processing concepts with limited or no equipment	11	32.4	7	20.6	9	26.5	4	11.8	1	2.9	2	5.9

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota High School (N = 34)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	8	23.5	13	38.2	7	20.6	4	11.8	0	0	2	5.9
b. Being fair and objective in class	16	47.1	10	29.4	3	8.8	2	5.9	0	0	3	8.8
c. Developing good interpersonal relationships	15	44.1	11	32.4	3	8.8	2	5.9	0	0	3	8.8
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	9	26.5	16	47.1	5	14.7	2	5.9	0	0	2	5.9
b. Developing professionalism as related to professional organizations and literature	8	23.5	14	41.2	6	17.6	3	8.8	0	0	3	8.8
c. Determining ways of keeping current within the area of data processing	13	38.2	12	35.3	3	8.8	3	8.8	0	0	3	8.8

Table 54

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Wisconsin High School (N = 63)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	8	12.7	14	22.2	22	34.9	10	15.9	3	4.8	6	9.5
b. Articulating data processing instruction with other educational institutions	7	11.1	14	22.2	21	33.3	12	19.0	4	6.3	5	7.9
c. Organizing time so as to be well prepared for classroom instruction	24	38.1	23	36.5	10	15.9	3	4.8	0	0	3	4.8
d. Determining the appropriate pace at which to present materials	24	38.1	26	41.3	8	12.7	2	3.2	0	0	3	4.8
e. Determining the appropriate length of time to spend on any one subject	20	31.7	25	39.7	13	20.6	2	3.2	0	0	3	4.8
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	8	12.7	24	38.1	20	31.7	7	11.1	0	0	4	6.3
b. Relating the research to curriculum decisions	8	12.7	14	22.2	24	38.1	10	15.9	2	3.2	5	7.9
c. Developing unit instructional plans	15	23.8	28	44.4	12	19.0	3	4.8	1	1.6	4	6.3
d. Developing daily lesson plans	15	23.8	26	41.3	10	15.9	5	7.9	2	3.2	5	7.9
e. Developing audio-visual materials	16	25.4	23	36.5	15	23.8	4	6.3	1	1.6	4	6.3
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	12	19.8	27	42.9	17	27.0	2	3.2	0	0	5	7.9
g. Making data processing practical rather than theoretical for students	20	31.7	30	47.6	8	12.7	1	1.6	0	0	4	6.3
h. Integrating theoretical considerations with practical applications	13	20.6	23	36.5	19	30.2	2	3.2	2	3.2	4	6.3

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Wisconsin High School (N = 63)

Competency	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	5	7.9	7	11.1	34	54.0	10	15.9	1	1.6	6	9.5
b. Helping students who have reading problems	11	17.5	19	30.2	18	28.6	8	12.7	1	1.6	6	9.5
c. Providing students with the opportunity for supplemental learning	9	14.3	21	33.3	26	41.3	2	3.[illegible]	0	0	5	7.9
d. Eliminating distracting mannerisms from classroom presentations	5	7.9	19	30.2	22	34.9	11	17.5	1	1.6	5	7.9
e. Determining the time and variety of activities so as to keep the class interesting	18	28.6	28	44.4	10	15.9	2	3.2	0	0	5	7.9
f. Utilizing guest speakers effectively	8	12.7	18	28.6	29	46.0	3	4.8	0	0	5	7.9
g. Individualizing instruction for the needs of specific students	14	22.2	24	38.1	15	23.8	5	7.9	0	0	5	7.9
4. Student Evaluation												
a. Preassessing student competencies	5	7.9	18	28.6	24	38.1	10	15.9	1	1.6	5	7.9
b. Developing tests for achievement evaluation	10	15.9	26	41.3	21	33.3	2	3.2	0	0	4	6.3
c. Determining appropriate standards to be used in the classroom	11	17.5	33	52.4	12	19.0	3	4.8	0	0	4	6.3
5. Facilities												
a. Utilizing the library in instruction	5	7.9	13	20.6	26	41.3	13	20.6	1	1.6	5	7.9
b. Utilizing field trips effectively	10	15.9	20	31.7	26	41.3	2	3.2	0	0	5	7.9
c. Planning for the acquisition of equipment in data processing	14	22.2	17	27.0	19	30.2	6	9.5	2	3.2	5	7.9
d. Teaching data processing concepts with limited or no equipment	20	31.7	19	30.2	13	20.6	6	9.5	1	1.6	4	6.3

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Wisconsin High School (N = 63)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	12	19.0	17	27.0	23	36.5	6	9.5	0	0	5	7.9
b. Being fair and objective in class	28	44.4	17	27.0	9	14.3	4	6.3	0	0	5	7.9
c. Developing good interpersonal relationships	19	30.2	28	44.4	8	12.7	3	4.8	0	0	5	7.9
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	16	25.4	21	33.3	14	22.2	8	12.7	0	0	4	6.3
b. Developing professionalism as related to professional organizations and literature	10	15.9	17	27.0	19	30.2	13	20.6	0	0	4	6.3
c. Determining ways of keeping current within the area of data processing	17	27.0	27	42.9	11	17.5	4	6.3	0	0	4	6.3

Table 55

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota Community College (N = 8)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
1. Planning												
a. Cooperating with departments outside of Business in the offering of data processing instruction	3	37.5	1	12.5	1	12.5	2	25.0	1	12.5	0	0
b. Articulating data processing instruction with other educational institutions	3	37.5	1	12.5	1	12.5	2	25.0	1	12.5	0	0
c. Organizing time so as to be well prepared for classroom instruction	4	50.0	2	25.0	1	12.5	1	12.5	0	0	0	0
d. Determining the appropriate pace at which to present materials	4	50.0	2	25.0	1	12.5	1	12.5	0	0	0	0
e. Determining the appropriate length of time to spend on any one subject	3	37.5	2	25.0	1	12.5	1	12.5	0	0	1	12.5
2. Curriculum Development												
a. Developing behavioral objectives for a data-processing course	5	62.5	1	12.5	2	25.0	0	0	0	0	0	0
b. Relating the research to curriculum decisions	4	50.0	0	0	3	37.5	1	12.5	0	0	0	0
c. Developing unit instructional plans	4	50.0	1	12.5	2	25.0	1	12.5	0	0	0	0
d. Developing daily lesson plans	4	50.0	2	25.0	1	12.5	1	12.5	0	0	0	0
e. Developing audio-visual materials	5	62.5	1	12.5	2	25.0	0	0	0	0	0	0
f. Evaluating instructional materials, including textbooks, audio-visual materials, etc.	5	62.5	2	25.0	0	0	1	12.5	0	0	0	0
g. Making data processing practical rather than theoretical for students	6	75.0	2	25.0	0	0	0	0	0	0	0	0
h. Integrating theoretical considerations with practical applications	6	75.0	2	25.0	0	0	0	0	0	0	0	0

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota Community College (N = 8)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
3. Methodologies												
a. Relating research to classroom activities	3	37.5	1	12.5	1	12.5	0	0	2	25.0	1	12.5
b. Helping students who have reading problems	3	37.5	2	25.0	1	12.5	1	12.5	1	12.5	0	0
c. Providing students with the opportunity for supplemental learning	2	25.0	3	37.5	2	25.0	1	12.5	0	0	0	0
d. Eliminating distracting mannerisms from classroom presentations	3	37.5	3	37.5	1	12.5	1	12.5	0	0	0	0
e. Determining the time and variety of activities so as to keep the class interesting	4	50.0	1	12.5	2	25.0	1	12.5	0	0	0	0
f. Utilizing guest speakers effectively	2	25.0	3	37.5	2	25.0	1	12.5	0	0	0	0
g. Individualizing instruction for the needs of specific students	4	50.0	4	50.0	0	0	0	0	0	0	0	0
4. Student Evaluation												
a. Preassessing student competencies	3	37.5	3	37.5	1	12.5	1	12.5	0	0	0	0
b. Developing tests for achievement evaluation	4	50.0	3	37.5	1	12.5	0	0	0	0	0	0
c. Determining appropriate standards to be used in the classroom	4	50.0	3	37.5	1	12.5	0	0	0	0	0	0
5. Facilities												
a. Utilizing the library in instruction	2	25.0	3	37.5	1	12.5	2	25.0	0	0	0	0
b. Utilizing field trips effectively	2	25.0	4	50.0	2	25.0	0	0	0	0	0	0
c. Planning for the acquisition of equipment in data processing	3	37.5	0	0	4	50.0	0	0	1	12.5	0	0
d. Teaching data processing concepts with limited or no equipment	4	50.0	1	12.5	2	25.0	1	12.5	0	0	0	0

Data Processing Teaching Competencies
Importance Of This Competency In My Class(es)

Competency	Minnesota Community College (N = 8)											
	Essential		Very Important		Somewhat Important		Not Important		Not Familiar		No Response	
	n	%	n	%	n	%	n	%	n	%	n	%
6. Human Relations												
a. Providing guidance to students as related to personal problems	3	37.5	5	62.5	0	0	0	0	0	0	0	0
b. Being fair and objective in class	5	62.5	3	37.5	0	0	0	0	0	0	0	0
c. Developing good interpersonal relationships	5	62.5	3	37.5	0	0	0	0	0	0	0	0
7. Other												
a. Developing a philosophy regarding the role of the teacher in the classroom	5	62.5	2	25.0	1	12.5	0	0	0	0	0	0
b. Developing professionalism as related to professional organizations and literature	6	75.0	1	12.5	1	12.5	0	0	0	0	0	0
c. Determining ways of keeping current within the area of data processing	5	62.5	3	37.5	0	0	0	0	0	0	0	0